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WATER AND ELECTROLYTE BALANCE IN SURGERY*

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FORTUNATELY, the majority of surgical patients are in a position to ingest water and food-stuffs by mouth; frequently, however, this is not the case, particularly in abdominal cases. Abnormal losses also of essential substances and of water not infequently occur. Since, as Coller and Maddock[1] have stated, "Protoplasm is a suspension of protein in salty water of definite composition; tissue is a mass of units of protoplasm surrounded by spaces filled with salt solution", it is of the utmost importance that both the water and electrolytes dissolved in it be maintained in a constant relationship. Under ordinary conditions of health our natural appetites and thirsts, habits, and other functions arrange for the maintenance of water and electrolyte demands without our planning for it. Under extraordinary conditions of privation, hardship, or disease it becomes necessary to enquire into the fundamentals of the matter and to recognize deviations of amounts and intelligently to apply our knowledge.

Many of the surgical emergencies which we are called upon to treat have their fundamental background based upon loss or limitation of oxygen, fluid, water, salt and glucose. Coller and Maddock[1] quote Rubner who states that in starvation an animal may lose practically all of its glycogen and fat, half of its body protein, 40 per cent of its total body weight, and still live; whereas the loss of 10 per cent of the water content results in serious disorder, and the loss of from 20 to 22 per cent results in death.

For many years although water, and to a lesser degree salt, was supplied in post-operative cases in a haphazard fashion it has been only within the past ten years, and more particularly within the past two or three years, that a sound basis for the control of water and electrolyte balance by the surgeon has been laid. Although the investigations of physiological chemists have been made use of, certain names, more especially Coller and Maddock,[1] Pfeiffer[2] and Drew, Scudder and Papps[3] are intimately associated with this aspect of the subject.

NORMAL SOURCES OF WATER

The water available for purposes of metabolism under normal conditions comes from three sources: the fluids drunk; the water content of the solid food-stuffs; and the water formed during the process of oxidation of the proteins, fats and carbohydrates eaten.

Ordinarily our bodies receive water from two sources: first, the exogenous, that is the water which is taken by mouth in the form of food and drink. In the surgical patient, either as the result of fluid loss prior to operation, during operation, or during the immediate post-operative period, or due to a restriction of intake, this source may be seriously depleted.

The endogenous source of water supply is limited to little more than 600 c.c. This water is derived from the liberated or preformed water in the tissues which may be released by oxidation of body cells; also, proteins, fats and carbohydrates when broken down yield under normal conditions something less than 400 c.c. When, however, intake falls or digestive activities are damaged this source fails.

LOSS OF WATER

Of perhaps even greater importance than an appreciation of the normal sources of water

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supply to the tissues is a recognition of the loss of water in each twenty-four hour period. Since the loss in the kidney excretion is obvious it has been too generally accepted as constituting the major loss. The fact is that under normal conditions without obvious perspiration evaporation from the lungs and from the skin amounts to between 1,000 and 1,500 c.c. and that under conditions of sweating and increased respiratory function this loss may be enormously increased.

The water lost in the fæces is normally small, not more than 250 c.c., but in the presence of enteritis, diarrhœa or ileus, and particularly in the last condition, there is an accumulation of large amounts of fluid in the stomach and intestines which amounts for all practical purposes to loss of body fluid.

THE COMPONENTS OF WATER BALANCE IN HEALTH

Available water		*Excreted water*	
Water drunk	1,200	Water of urine ..	1,200
Food, diet, or body substance			
Water content ...	1,000	Water of stool ...	100
Water of oxidation	300	Water vaporized..	1,200
	2,500		2,500

(Coller and Maddock)

THE DAILY WATER REQUIREMENTS OF THE SURGICAL PATIENT

	c.cm.
Uncomplicated case	
Water for vaporization	1,000 to 1,500
Water for urine	1,000 to 1,000
	2,000 to 2,500
Complicated case: fever, hyperthyroidism, hot humid weather	
Water for vaporization	2,000 to 2,000
Water for urine	1,000 to 1,500
	3,000 to 3,500

(Coller and Maddock)

It has been shown by Blalock and others that under certain conditions, also, the accumulation of tissue fluids outside of the vessels in traumatized areas plays an important rôle in dehydration.

Under normal conditions the secretion of the salivary glands, the stomach, liver, and pancreas totals several litres a day, but, since for the most part the water from these sources is reabsorbed from the lower intestinal tract, this potential loss becomes operative only when, as the result of vomiting, secretion, decompression or fistulous discharge, the bowel is not given an opportunity to carry out this function.

Reduced to its simplest form, the body may be regarded as an aggregation of cells each bounded by a cell membrane which has some of the properties of a semipermeable membrane, and which separates the cellular fluid from the extra-cellular fluids lying in the spaces between the cells. These latter spaces, in turn, are separated from the blood stream by the capillary walls which also have some of the properties of the semipermeable membrane.

Water passes readily from one system to the other. It may pass from the blood stream to the extra-cellular spaces and thence into the cells, passing en route through the capillary wall and the cell membrane. Its flow in the opposite direction follows the same course but in the opposite direction. Of the factors that govern the direction of the flow two stand out as being of the greatest importance. They are the osmotic pressure and the hydrostatic pressure. The action and interaction of these factors is well understood and it will suffice to examine briefly their effects.

The osmotic pressure of the blood, or, more properly, of the blood plasma, depends upon the substances it maintains in solution—proteins, sugar, cholesterol, sodium chloride and bicarbonate, to mention a few. Each exerts an osmotic pressure. Bearing this in mind, it will be seen that variations in the values of these substances in the blood plasma will affect the osmotic pressure of the plasma, and hence will bring about a migration of fluid in one direction or the other, affecting the fluid content of both the extracellular spaces and of the cells themselves. Since, however, the capillary wall is permeable to substances of small molecular volumes such as NaCl, for all practical purposes the plasma osmotic pressure is dependent upon its protein content.

From a surgical standpoint the vast majority, though not all, of the water balance problems are concerned with a state described as dehydration.

Bearing in mind the above-mentioned facts concerning the distribution of body fluids we may now examine the mechanism of dehydration in, for example, vomiting. Here fluid secreted into the stomach and duodenum and normally reabsorbed is lost. As the fluid is lost the remaining constituents of the blood plasma become concentrated, with a resultant rise in osmotic pressure of the plasma. Fluids, therefore, pass from the extracellular spaces into the blood stream, this passage being facilitated by the lowered hydrostatic pressure in the capillaries, as evidenced by the drop in blood pressure

which usually follows vomiting. With passage of fluid out of the extracellular spaces the osmotic pressure of the remaining fluid is raised, and hence fluid is withdrawn from the cells, thereby bringing about dehydration. It must be remembered that in these conditions bringing about dehydration water is not the only substance lost; there is an inevitable loss of electrolyte, the nature of which depends upon the site from which the loss occurs. Therefore, associated with dehydration there is usually an upset in the acid-base equilibrium.

The surgeon is faced with the task of replacing both water and salts in their proper proportions. It is admitted that in the average case more or less haphazard administration of fluids will tide the patient over the crisis and he will recover. As previously stated, there are many cases, however, in which dehydration is severe and in which the factors bringing about the dehydration cannot be immediately checked. It is in this group that fluid administration must be carefully controlled. The dangers of uncontrolled fluid therapy are threefold. One may give too little fluid, too much fluid, or the wrong kind of fluid.

The simplest method of determining that a sufficient amount of water is available for tissue function is by measurement of the amount of urine excreted. The amount positively required for adequate elimination of waste products by the kidneys will depend upon the functional capacity of these organs. It is known that normal kidneys that are competent to concentrate up to a specific gravity of approximately 1.030 require less than 500 c.c. Under diseased conditions, however, when a specific gravity of 1.012 or thereabout is the highest concentrating capacity exhibited, almost 1,500 c.c. are required. These figures, which have been developed by Lashmet and Newburgh, are based upon a necessity for the excretion of 35 grams of waste material. If the amount of waste material as the result of disease processes is higher a larger amount of water must be excreted in order to avoid the retention of toxic products.

If a figure approximating 1,000 c.c. daily is obtained as a urine output it can as a rule be taken for granted that dehydration is not taking place and waste product accumulation need not be feared. However, in the case of patients suffering from sepsis, severe biliary or renal impairment, a larger quantity, at least 1,500 c.c., may be necessary.

The total requirement of fluid in the first twenty-four hours following operation is rarely less than 3,500 c.c., and may reach as high as 6,000 to 7,000 c.c. The amount necessary for subsequent days should be calculated; the total amount diminishes as a rule with the improvement in the patient's general condition.

METHODS OF INTRODUCING FLUIDS

About thirty years ago John B. Murphy urged the inadvisability in post-operation cases of introducing water *per orem,* and recommended the employment of rectal administration or proctoclysis. Murphy's technique, although not now generally employed, is well known to all at any rate of the older generation of surgeons. The senior author has for many years been of the opinion that the chief difficulty in obtaining effective absorption of fluids from the large bowel by the employment of Murphy's continuous infusion has been the presence of the indwelling catheter. I feel convinced that it is the catheter which the bowel attempts to evacuate and not the fluid, whether this be water, hypotonic saline, or hypotonic saline plus hypotonic glucose. I have for a great many years introduced from 4 to 8 pints (80 to 160 oz., or 2,400 to 4,800 c.c.) per rectum during the first twenty-four hours as a routine following practically all abdominal operations. This has been introduced as four doses of 20 oz. each of 1 per cent sodium bicarbonate at three-hour intervals, the first, immediately upon return of the patient to his bed. Subsequently four further 20 oz. doses of one-half normal sodium chloride with 2½ per cent glucose at four hour intervals are often administered.

I have been impressed by the fact that it is a very much simpler matter to avoid vomiting than to arrest vomiting, once it has taken place. Vomiting, moreover, is unusual if fluid is not introduced into the stomach until such time as normal peristalsis has been re-established. The great majority of patients do not suffer from thirst if this comparatively large amount of fluid is introduced by rectum, and are consequently willing to forgo the pleasures of ingestion of fluid for at least twenty-four hours. Dryness of the mouth and the other unpleasant features which follow the prohibition of water *per orem* are minimized by swabbing the mouth with a mixture made up of equal parts of lemon juice and glycerine.

As proof, I believe, that it is the rubber tube in the rectum which is responsible for attempts on the part of the bowel to evacuate such bland fluids, is the fact that if such proctoclyses are introduced slowly they are retained with much less certainty than if the fluid is poured in as rapidly as possible. I believe that all nurses should have an opportunity of watching a barium enema introduced into the normal bowel in order that they may see how rapidly the material flows through the length of the colon up to the cæcum or beyond.

Time does not permit at this time a consideration of the usefulness, or otherwise, of the stimulus which is exerted upon the abdominal lymphatics by such a technique. The statement may, however, be made that our prolonged experience in the employment of this method in both clean and infected cases has convinced us of its effectiveness and safety.

Oral administration of water having been deemed or proved to be inadvisable, in my opinion the first alternative route should be the large bowel. If for any reason the latter route is found to be either impossible or inadequate there remain two other methods of administration of water, electrolyte, and nourishment, either of which is usually available, namely, the intravenous and the subcutaneous. To these routes should be added that of the indwelling jejunal tube and occasionally jejunostomy.

Although the subcutaneous method of administration has certain obvious advantages in the main I believe the disadvantages outweigh the former. We are left, therefore, with intravenous administration as the sheet anchor for the introduction of water and other essential constituents in the more seriously ill group of patients. The advantage of the intravenous method is primarily that we have under our control both a definite knowledge as to the amount and the rate of administration. Also, it is possible by this route to introduce whatever chemical substances may be deemed necessary.

METHODS OF ESTIMATION OF FLUID REQUIREMENTS

The question that arises in the individual case is, "How is one to determine the amount and type of fluid to administer?" The answer may be given in this way. We must first determine the degree of dehydration. This may be done in a variety of ways as: (1) red blood cell count; (2) hæmoglobin estimation; (3) hæmatocrit readings; (4) plasma protein estimation, which is made by the determination of (5) specific gravity of peripheral blood or plasma.

The degree of dehydration having been established by these means, it would seem logical to administer suitable fluids continuously, checking the blood findings from time to time until normal levels are attained. This method has been advocated recently by Drew, Scudder and Ball. They investigated the hæmatocrit and the plasma specific gravity (calculating from this plasma protein content), choosing these methods as being simple, rapid and accurate. By repeated observation in a patient they follow the effect of intravenous therapy, continuing it until relatively normal findings are established.

As stated previously, in conditions resulting in dehydration there is, besides a loss of water, a loss of electrolytes. Therefore, it would be reasonable to expect that if one should give to a dehydrated patient sufficient electrolytes in physiological concentration to restore the electrolyte values to normal, the dehydration would be corrected. That this is the case has been shown by Coller and Maddock, who have devised a method of controlling fluid administration by means of checking the plasma chlorides and the plasma CO_2 combining power. Further importance it attached to this method of fluid control by the fact that it has been repeatedly shown (Matas; Jones, Eaton and White; White, Sweet and Hurwitt; Coller and Maddock) that the administration of excess sodium chloride in a patient whose renal function is even slightly impaired (as it is in the majority of seriously ill patients) will result in a retention of chloride and consequent œdema of the tissues, particularly the brain, the heart, the liver, and the lungs. The added load of this œdema in the vital organs may have serious effects. This danger may be averted if, in the first instance, the plasma chloride levels are determined. Coller and Maddock have shown that if the chlorides be below normal it is possible to calculate fairly accurately how much chloride must be administered in order to restore the blood values to normal. For this calculation several formulæ have been put forward. The clinical rule developed by Coller and Maddock and their associates has been generally adopted. It states that "For each 100 mg. that the plasma chloride level needs to be raised to reach the normal (560 mg. per cent) the patient should be given 0.5 g. salt per kilogram body weight." This salt is

supplied in the form of Ringer's solution or normal saline.

One has, therefore, a choice or combination of two methods. One may follow the course of fluid therapy either by observing the state of hydration, following the observations of Scudder and Drew, or by giving an amount of sodium chloride calculated by formula to restore the electrolyte levels. If in a given case this formula be adopted, it will probably be found that with restoration of normal electrolyte values in the blood stream the state of dehydration will automatically be corrected. On the other hand, if one were to follow the first described method of giving sodium chloride solution until the dehydration (as measured by hæmoconcentration) be relieved, it will probably be found that the electrolyte disturbance will have been overcome. In the majority of cases either method will suffice. At the same time it would appear that greater accuracy may be attained if the two methods are combined, more particularly in patients who are seriously ill. By giving calculated amounts of sodium chloride one can avoid the danger of overloading the patient with salt. By checking the state of hydration from time to time one can be certain that sufficient fluid is being administered.

The details of the following case illustrate some of the points discussed above.

CASE REPORT

L.C., female, aged 29, was admitted on February 12, 1940, complaining of pain in the right upper quadrant of the abdomen which had commenced suddenly twelve days previously. Physical examination revealed a sick woman; temperature 101.2°; pulse 108; respirations 20. A tender mass was palpable in the right upper quadrant, extending into the right flank. The appendix had been removed twenty-six years previously. White blood cells 12,000; red blood cells 4,630,000; hgb. 70 per cent.

X-ray investigation of the chest, gastrointestinal tract, genito-urinary tract and gall-bladder showed nothing abnormal except for a gas-containing shadow in the right flank displacing the ascending colon and the hepatic flexure to the left and an incompletely filling duodenal cap. There was no gastric retention, and gastric analysis revealed normal findings.

A tentative diagnosis of perforated duodenal ulcer with abscess formation was made. Operation was performed on February 23, 1940. The abscess was opened through a transverse incision above the umbilicus. The cavity was evacuated and packed with gauze. This packing was changed five times between February 23rd and March 20th. There was a slight serosanguineous discharge from the wound March 12th, when it was noted that the discharge was more profuse and that it had a foul odour. Culture of the discharge revealed *B. pyocyaneus* and *B. coli*.

The discharge continued but there was no excoriation of the skin noted until March 25th. At this time methylene blue given by mouth appeared in the wound within twenty-five minutes and it was obvious that an intestinal fistula had been established. Up to this time the patient had been taking food and fluids by mouth fairly well and appeared to be holding her own. With the establishment of the intestinal fistula, however, the fluid loss became excessive, and the patient became dehydrated during the course of the next four days.

On April 1st her plasma chlorides were 314 mg. per cent (normal 560 mg.), and her CO_2 combining power was 94 volumes per cent (normal 55 to 60 volumes per cent). She showed all the clinical evidences of dehydration, including a drop in urinary output from a previous daily average of 650 c.c. to 225 c.c.

The situation was summed up, as follows: (1) The patient had an upper intestinal fistula—probably duodenal. (2) Through this fistula she was losing fluids and electrolytes—probably mainly chlorides, accounting for the marked reduction in plasma chlorides and the high CO_2 combining power. (3) Steps must be taken to (*a*) correct the dehydration and the electrolyte loss, and (*b*) close the fistula.

The following regimen was, therefore, planned. A continuous intravenous drip was set up, running at 200 c.c. per hour or 4,800 c.c. in twenty-four hours. The amount of chloride to be given was calculated thus:

CALCULATION OF CHLORIDE REQUIREMENTS

Patient's weight ..... 41.6 kilograms
Plasma chlorides ..... 314 mg. per cent
Normal plasma chlorides ..... 560 mg. per cent
Plasma chlorides must be raised.... 246 mg. per cent
Therefore patient should be given:
2.46 x 0.5 x 41.6 g. of salt, or 51,168 g.
Now 1 litre of Ringer's solution contains 9 g. salt.
Therefore patient should be given 51.158/9 litres, or 5.68 litres.

Theoretically, if this amount of Ringer's solution be given the patient plasma chlorides would return to normal. It will take time, however, to give this amount of fluid, and during this time the patient will be losing chlorides through the fistula. Therefore, it will be necessary to administer a larger quantity of chloride; the additional amount to be given will depend upon the amount of chloride lost during the administration.

During the next seventy-two hours the patient was given 7,700 c.c. Ringer's solution plus 6,700 c.c. 10 per cent dextrose in distilled water. The effect of this therapy is shown by the blood findings which were, as follows:

Date	*Plasma chlorides*	*CO_2C.P.*	*Plasma proteins*	*Hæmatocrit*
April 1	314	94		
" 2		88		
" 3	360	78		
" 4	420	63	7.0	
" 6	510	53	8.05	
" 11	610	47		41 per cent

In an attempt to induce the fistula to close a continuous gastroduodenal suction was instituted; the patient was given nothing by mouth and she was placed on her left side. These measures had some effect, for the discharge from the wound decreased and the surrounding excoriations commenced to heal. Nevertheless the fistula did not close, for on April 5th methylene blue taken by mouth appeared in the wound within fifteen minutes.

Realizing that intravenous therapy could not be continued indefinitely, it was decided that some other means of feeding the patient must be found. On the following day a jejunostomy was performed and feedings containing milk, vitamin concentrates, liver extracts, etc., were commenced. When the gastric suction was discontinued, the discharge from the fistula became very profuse. At first this discharge was suctioned off into a bottle and returned into the jejunostomy tube along with the feedings. This procedure was troublesome, and, after a short time, an apparatus devised by our associate, Dr. Eric Macnaughton, and described by him,[4] was set up. By this means a continuous flow of

duodenal fluid passed from the opening of the fistula into the jejunostomy tubing, being interrupted only when the patient was receiving her jejunal feedings.

This method proved very satisfactory and was continued until April 28th, by which time the fistula was completely closed.

It will be noted here that the fluid administration was controlled entirely by plasma chloride estimations. After she had received feedings through the jejunostomy for five days a check of the blood findings revealed plasma chlorides 610, CO_2 combining power 47. Once the jejunostomy was established and the apparatus was set up to return all drainage from the fistula back into the intestine through the jejunostomy the administration of fluids became a simple matter. The patient was encouraged to eat and drink, and she was given as much of the feedings through the jejunostomy as she could tolerate.

During this period two interesting problems arose. For one week after the jejunal feedings were commenced her daily output of urine averaged just over 500 c.c. At the time, it was felt that this output was too low and that it indicated an inadequate fluid intake. It was, therefore, decided to administer the jejunal feedings continuously in an effort to increase the intake. After twenty-four hours of this treatment, during which time the patient was given 3,100 c.c. by jejunostomy as well as several hundred c.c. by mouth, she passed into a state resembling shock, exhibiting cold clammy skin, an intense pallor, and a drop in blood pressure to 80/60. This was thought to be a result of water intoxication, and with restriction of fluids for eight hours the patient improved rapidly. Following this the original plan of feeding was instituted and the patient's recovery was uninterrupted. At the time of discharge her urine volume averaged 1,000 c.c. daily.

Upon reviewing these facts it would appear that the low urine output at first was not due to an inadequate intake of fluid but rather to the fact that the patient, as she improved, was storing glycogen and protein and along with them water. Thus, she was retaining more water than she would under other conditions, hence the lowered urinary output.

In the above description an attempt is made to outline a method of treatment of the established case of dehydration. It remains to outline a routine for the prevention of dehydration. It is a practice in many hospitals to limit the fluid intake *per orem* in certain post-operative cases. In these cases it is essential to replace the fluid lost in the urine and by vaporization. In the patient of average size 2,000 c.c. of glucose in distilled water given intravenously will make good this loss. Along with the loss of fluid under these conditions there is a small loss of salts, and to correct this 500 c.c. of normal saline may be given. These 2,500 c.c. of fluid will tend to maintain the normal water balance in the average-sized patient under normal conditions. It stands to reason that in the larger patients, those with high fever and those losing larger quantities of fluid than normal (as in excess sweating), more fluid will be required to prevent dehydration. In patients losing large amounts of fluids as a result of vomiting, gastroduodenal suction, or drainage from biliary or intestinal fistula, it will be necessary to replace this loss, volume for volume, in addition to supplying fluid to make up for the ordinary loss (as described above).

Thus, if a patient were to lose 1,000 c.c. of gastroduodenal secretion he would require in a twenty-four hour period 1,000 c.c. of saline to make up for loss by gastric suction; 500 c.c. of saline to make up for loss of chloride in urine and sweat; 2,000 c.c. of 5 per cent glucose in water to make up for fluid loss in urine, stool and by evaporation, a total of 3,500 c.c.

In actual practice it is wiser to commence the fluid therapy at the same time as the gastroduodenal suction. The following sample scheme is offered. Give 1,500 c.c. normal saline solution plus 2,000 c.c. 5 per cent glucose in distilled water. After the first twenty-four hours give 2,000 c.c. 5 per cent glucose in water, plus 500 c.c. normal saline plus volume of saline equal to volume of fluid withdrawn from stomach during the first twenty-four hour period. By such means it is possible to maintain a patient's water balance, no matter how much fluid he loses.

The importance of plasma protein in the maintenance of osmotic pressure has but recently attracted the attention it deserves. The institution of blood and serum banks in many hospitals is but one proof of this greater appreciation of this aspect of water balance in surgery.

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POST-OPERATIVE PERFUSION OF THE BILIARY DUCTAL SYSTEM

(PRELIMINARY REPORT)

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THE present report concerns a new post-operative method of cleansing the biliary ductal system, and the application of thermostatically controlled heat to the interior of the biliary tract. Early investigations indicate that the method to be described presents certain advantages over those now in use.

Cholecystectomy does not remove all the pathological changes, nor can it remove all the causative factors of biliary tract disease. Something else, therefore, must sometimes play a part in successful treatment. This "something else" is often the presence of a normal ductal system. However, in some instances where cholecystectomy is performed insufficient effort is made to produce such a normal state. It would therefore seem reasonable to institute drainage of the ductal system—in selected cases—even though the common duct appears normal in the gross. This can be done directly through a common duct drain or indirectly through a bladder stump drain. Such drains can be used as part of an apparatus for thoroughly cleansing the ductal system by perfusion, and the cleansing may prove to be a factor in reducing the incidence of post-operative symptoms. This paper will discuss briefly the possibilities of such cleansing by perfusion.

Successful efforts have been made by Walters and Wesson[24] and by Pribram,[23] among others, to remove common duct stones post-operatively by the instillation of ether which fragments the stones and allows them to pass through the sphincter. Best, Hicken and Finlayson[5] described a method of removing stones by increasing the production of liver bile (which increases the ductal pressure) and relaxing the sphincter with glyceryl trinitrate. This is a satisfactory method of non-operative washing of the common duct. Best and Hicken[4] have also washed stones out of the duct by the use of a syringe attached to the drainage tube. These methods are used for stones which are visible by cholangiogram, and they are a decided improvement in the treatment of such conditions. *There is, however, less improvement in the treatment of the pre-calculous state and other pathological conditions, both of which may remain after operation.* Hence the discussion of a possible improvement.

BILIARY PERFUSION

The method of perfusion as first used and its theoretical value can be summarized as follows. (1) The ductal system is slowly filled with heated saline through a continuous intravenous apparatus and a vacuum drip. This allows of a slow, gradual and maximal increase in pressure always under control; of a simple method of estimating the tone of the sphincter; of always being able to measure the ductal pressure and of having a large reserve of saline ready for irrigation and flushing (Fig. 1); (2) a "flushing" action will result when the sphincter, made artificially spastic by morphine and holding back the intravenous fluid under pressure, is suddenly released by one or all of several methods—olive oil or magnesium sulphate through a duodenal tube, amyl nitrite, or glyceryl trinitrate.[21] This is comparable to the rush of water through a dam when the flood gates are opened; (3) the procedure can be evaluated by examination of the "washings" collected through a duodenal tube as they leave the ampulla (Fig. 2); (4) the irrigations which follow the flushing can be continuous, and antiseptics, solvents, or fluids heated by thermostatic control, can in this way be applied directly to the interior of the biliary system. The therapeutic value of heat in other pathological conditions has long been appreciated, but equally long neglected in biliary disease; (5) this method might wash small stones, infective matter, débris and other stone-forming elements from the ductal system. If this is true it is evident that some of the future symptoms might be prevented, and in some cases the necessity of a second operation avoided. Heat might also improve the circulation of the blood and lymph; (6) if the blood and lymph circulation could be improved it is likely that pancreatic involvement would be decreased.

This routine has been greatly simplified. The ducts are now perfused through a continuous

intravenous apparatus following a relaxing medication only. No morphine is given. The pressure is controlled by the height of the fluid level. It can be easily performed by the patient at home. The intravenous jar can be enclosed in a water jacket so that the perfusing fluid can be heated to any desired temperature (Figs. 4 and 5).

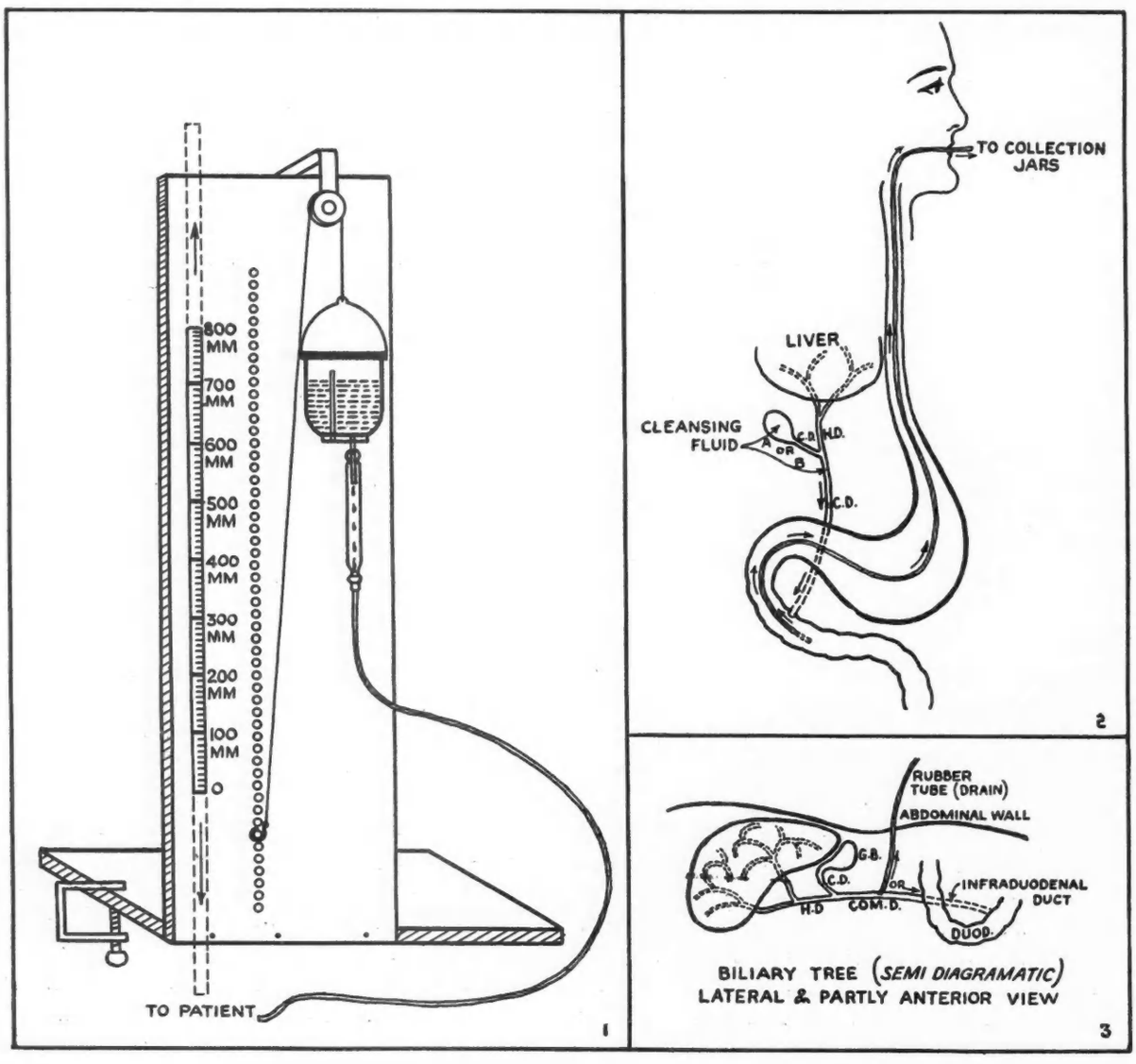
A cholangiogram will show the approximate size and position of stones. This should always be done before perfusion because there is a possibility that irrigation might carry a calculus to a point where impaction could occur.

TECHNIQUE OF THE METHOD

The technique of the method is described in the figures submitted here, with running comments.

Fig. 1.—The choledochometer.—The illustration is not proportionate. The scale should extend from the top to the bottom of the backboard. It is movable (indicated by arrows), so that the 0 mm. reading can be placed at the level of the common duct whether it be above or below the base board. The base board can be clamped by a universal clamp to a shelf or bed-frame. At operation the depth of the common duct below the anterior abdominal wall is determined by means of a sterile ruler, so that the level of the duct is known when the patient is lying flat in bed. About the tenth or twelfth post-operative day the irrigation is started providing drainage has been satisfactory.

The saline jar is connected to the drainage tube (either in the common duct or gall-bladder stump) and the fluid level is raised or lowered to the level of the common duct. This is at 0 mm. on the choledochometer. The jar is raised slowly and saline starts to drop in the vacuum as soon as the outside pressure is greater



than the pressure in the ductal system. The dropping continues until the pressures are equal. The outside pressure is increased 1 cm. (10 mm.) by raising the fluid level and the saline again drops until the pressures are equal, which is told, as before, by the drip stopping. This same procedure is repeated until after two successive rises of 1 cm. each there is no dropping in the intravenous vacuum drip. The ductal system has therefore received its maximum amount of fluid, and discomfort may supervene at this point due to distension. Nausea might also be present. The fluid level continues to be raised slowly until the drip begins again. This occurs as soon as the fluid leaks past the sphincter. The reading on the choledochometer shows graphically the tonus of the sphincter, which is further indicated by the increase in pressure necessary to open it; *i.e.*, from the level the dropping stops until it starts again. Although no more fluid has entered during this rise, the pressure has been increased (as the pressure on water in a syringe can be increased by pressing on the piston).

After this maximum pressure has been reached morphine may be given (not a routine). This produces a spasm of the lower ductal segment and raises the intraductal pressure 200 to 300 mm. water.[5] The dropping in the vacuum stops and pain is relieved. By raising the fluid level the biliary pressure is increased to its maximum, which is indicated by the fluid again starting to drop. Because of the increased pressure the fluid (heated saline, antiseptics or solvents) may penetrate into the fine liver radicles and cleanse portions of the intrahepatic biliary tract which can be reached in no other way. At this point olive oil or magnesium sulphate, or both, are injected through a duodenal tube already in place, and at the same time amyl nitrite is inhaled, and, if necessary, gr. 1/100 of nitroglycerine is placed under the tongue (trinitrine, glyceryl trinitrate). When large amounts of fluid are to be used for irrigating it is wise to give the latter drug in addition. Its initial action is about 5 minutes slower than amyl nitrite, which is immediate, but it lasts longer (one hour). This is an obvious advantage. Due to the sudden release of the sphincter (amyl nitrite produces an immediate fall to zero[21]), the fluid rushes or "gushes" into the duodenum carrying with it material from the ducts, and the vacuum drip will start to drop again, quickly increasing in intensity until the drops cannot be counted. On occasion it might run with a steady stream. The quickness with which the sphincter opens after the vacuum starts dropping, as indicated by the rate of dripping, is an added indication of its tonus. When the fluid is flowing through the duct, and the sphincter is open, the speed and force of the flow can be increased by raising the fluid level. This may have to be done even after amyl nitrite if the morphine produces a prolonged spasm. The speed of the flow is more or less controlled by the pain. The vagotonic or so-called spastic sphincter, it has been found, does not respond so well to olive oil or magnesium sulphate as to amyl nitrite or glyceryl trinitrate. During the application of heat the flow is slow and the pressures are disregarded after the flow is established. Pain is the guide.

Irrigation is a simple office procedure and can be continued by the patient at home. It will not interfere with work and is performed after a fatty meal or a drink of egg-nog made with cream, or olive oil by mouth, or magnesium sulphate. If this does not produce relaxation of the sphincter, glyceryl trinitrate gr. 1/100 can be used. In stubborn cases bellergal, 2 tablets twice a day, will definitely relieve the tonus, as will trasentine, 2 tablets once or twice a day.

The simplified technique allows heated fluids to run through the duct without the flushing action, and therefore without the administration of morphine. This is more satisfactory and less troublesome. Following relaxing medication the flow can be swift and the cleansing thorough. The heat may prove to be the most beneficial part of the entire process.

Fig. 2.—Shows the course of the cleansing fluid. Entrance to the biliary tract is by way of the gall bladder (A), or directly into the duct (B). The "washing" from the duct is collected through the tube which was in place for the injection of olive oil, and may contain stone-forming elements, as sand, gravel, crystals, etc. A thorough macroscopic and microscopic examination will evaluate the cleansing process. Although bacteriological studies of the "washings" have not been carried out it may be possible to follow the subsidence of infection by this method. Antiseptics may prove to be of value.

Fig. 3.—Illustrates "uphill" versus "downhill" drainage. The rubber tube (drain) represents a T tube or catheter in the common duct.

This is the present method of draining. The uphill drainage tube is a drain *only* when the intraductal pressure is great enough to force ductal contents straight uphill, and even when this occurs the heavier sediment settles in the bottom. It is a recognized fact that this does not thoroughly cleanse the ductal system. The method here described uses this drainage tube as a part of an irrigating system through which fluid enters the biliary tract under pressure (and under full control), and thoroughly cleanses the system by draining downhill along the natural anatomical route. In favour of the new method are the facts that all drainage is more satisfactory downhill; that this is the natural route; that controlled pressure will increase the cleansing properties; that antiseptics and solvents can be used; that the intra-hepatic ducts can be cleansed, and that controlled heat can be applied directly to the interior of the ductal system.

Fig. 4.—The heating apparatus showing component parts. Baxter intravenous jar (3) with added rubber collar (10) to provide a water-tight fit into the neck of tightening apparatus (9). The enclosing jacket (4) has a one-way air valve (5) on the top. A thick soft sponge rubber pad (8) is placed between the jar (4) and tightening apparatus (9) so that when the jar is screwed against the round cross bar (7) a perfectly tight fit is assured. The inflow and outflow openings (1 and 2) and vacuum drip (6) are connected as seen in Fig. 5. The cross bar (7) fits across the top of the enclosing jacket, and as it is screwed down by the thumb screws the neck is forced against the sponge washer, thus creating a water-tight fit.

Fig. 5.—This shows the heating jacket assembled with connecting tubes and thermometers. The inflow tube (1) and outflow tube with thermometer (2) are connected to an Elliott machine which controls the temperature and the flow rate of the heating fluid. The flow of this fluid is increased until it is raised in the enclosing jacket (4) to the top of the intravenous jar (3), so that the latter is entirely surrounded by controlled heat. As the water rises the air escapes through the one-way valve (5). The outflow air valve can be manually controlled by rolling down the rubber sleeve (Figs. 4 and 5), thus allowing air to leave without any valvular action. When the heating fluid is at the desired level the sleeve is rolled back to cover the opening, and this prevents any air entering. The pressure of the inflowing fluid is slightly lowered, but because no air can enter the outflow of fluid cannot exceed the inflow and the level is therefore kept stationary.

The temperature is controlled at the thermostatic end. The heat loss between the heat control and the outflow (2), *i.e.*, after circulation in the containing jacket, is only 1 to 2 degrees. The thermometer which registers the temperature of the inflowing biliary saline can be placed at any location between the intravenous jar and the abdominal opening, but is more accurate in the latter position. The mercury bulb (7) should be proximal to the abdominal opening. In this way the temperature of the solutions entering the tract is more definite and there is little heat loss between the point of heat registration and the actual heat application.

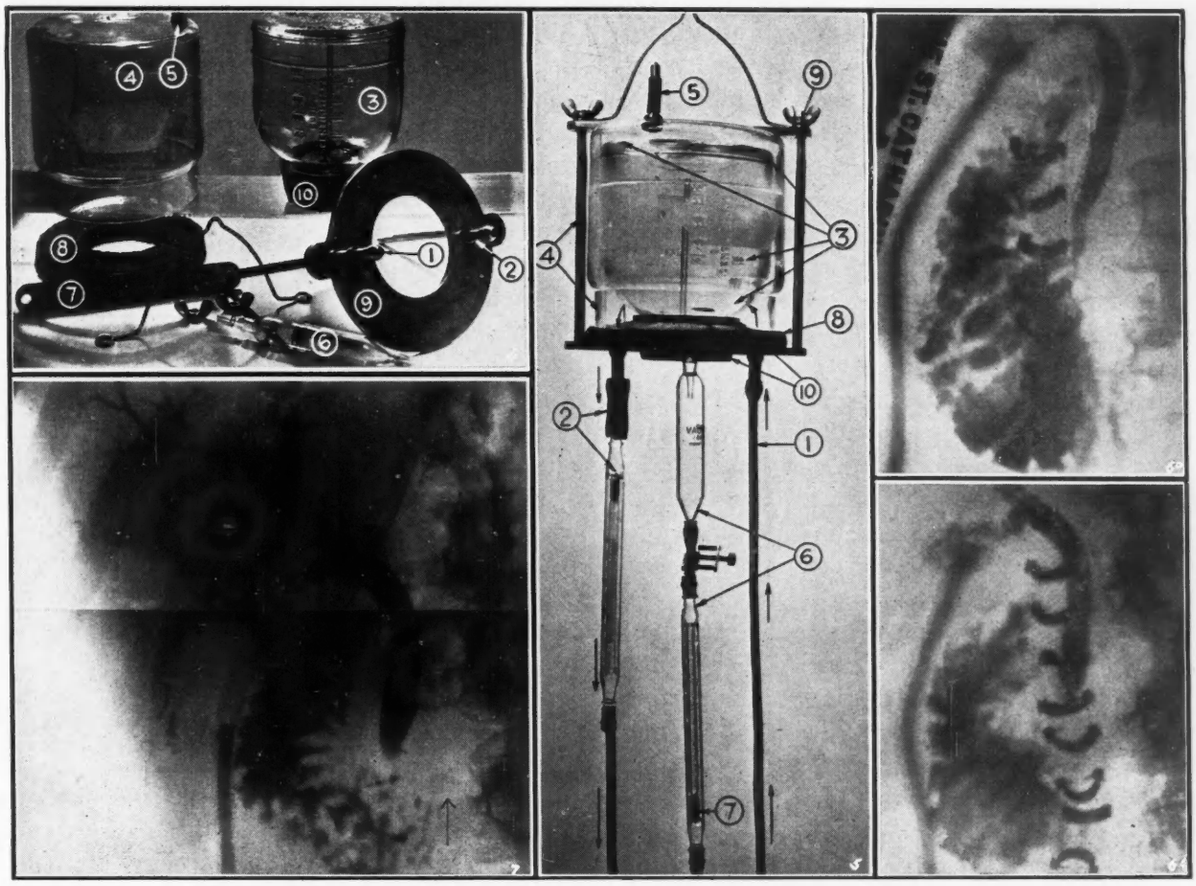
The saline jar is replaced by undoing the thumb-screws (9), lifting off the cross-bar and removing the outer jacket.

In the absence of proper heating equipment, a "Merit" heating jacket, which is made for Baxter jars, can be used, though not so satisfactorily.

The heat loss between the heated saline jar and the abdominal entrance of the irrigating fluid (which distance should be as short as possible) varies between 5 and 10 degrees, but the heat of the saline as it enters the biliary system can be satisfactorily controlled by the thermostat which determines the temperature of the surrounding water in the heating jacket.

Fig. 6.—(IMPORTANT: see explanation below).* —"A"; cholangiogram 3 days after cholecystectomy for advanced disease and cholelithiasis. Common duct not opened because of technical and dangerous difficulties. Mushroom catheter in dilated end of cystic duct. Lipiodol does not flow into the hepatic bile duct proximal to its junction with the cystic. Morphine had been given to increase the ductal pressure and force contrast medium towards the liver. The amount of dye in the duodenum shows that a

* EXPLANATION OF FIG. 6.—It is most unfortunate that the important sections of Fig. 6 were cut off when the block of plates was arranged and cannot be seen in these reproductions. At the top of Fig. 6a the cystic and common bile ducts should appear as a continuous tube with no shadow in the common hepatic duct or in the liver. This was due to an obstruction which was plainly seen in the original, after the injection pressure of the dye had been increased, as a mottled shadow 5/8 of an inch long, and which is just visible on the top of Fig. 6b. This obstruction is the important point in this discussion because by comparison with Fig. 7 it has disappeared after perfusion, and because it might have caused post-operative symptoms.



small quantity was not the cause of this failure. "B"; 15 minutes later. The injection pressure had been increased to its maximum (as determined by pain), and still there is an apparent obstruction to the flow through the proximal bile duct. The mottled appearance does not necessarily indicate stones. The increase in pressure is noticed in the terminal section of the common duct which in A is much narrower and not so well filled.

Fig. 7.—After 12 days' perfusion the apparent obstruction in Fig. 6 has disappeared and the contrast medium flows easily towards and into the liver radicals. It is suggested that heat and circulating fluids have dislodged and carried downhill the intraluminal obstruction, and therefore re-established a normal patency and a free flow of bile more thoroughly than a "T" tube might have done. For the first six post-operative days the total bile collected was 35 c.c. During the night of the seventh day an 8-ounce bottle overflowed and this free flow continued. The rounded shadow at the distal end of the common duct is not likely a stone, although the shadow (arrow) opposite the third lumber vertebra is suggestive of a pancreatic calculus.

DISCUSSION

1. *Uphill or downhill drainage.*—A T-tube or gall-bladder drainage is "uphill", and it cannot therefore be thorough. It is more rational to expect better drainage along the normal natural anatomical route, which is through the duct and the sphincter. This channel is "downhill" (Fig. 3). In reality a T-tube or substitute is a drain *only* when the intraductal pressure is great enough to force material out of, or up, the tube. Even this drainage is only the lighter material which floats to the top; the heavier débris settles to the bottom. Autopsy and operative findings show that the ducts are not always thoroughly cleaned by the present drains.[9, 25] A drainage tube then should be only a means to an end, *i.e.*, it should be a part of a drainage system, as in the new method, and not the entire drainage *per se*.

2. *Small duct involvement.*—It seems reasonable to believe that by the time gall-bladder dysfunction has become severe enough to produce symptoms demanding operation, the whole biliary tract is actually, or potentially, involved. Why, then, should we not treat disease other than that which can be plainly seen?—*i.e.*, by cleaning the ductal system? This would de-

crease the incidence of infection or other post-operative disease which remains in the inaccessible parts of the biliary tree (in the liver). In a certain percentage of cases this infection, whether associated with obstruction or not, might cause further trouble. This may be by the production of small calculi which grow and travel to the larger ducts[7, 14, 17, 16] or it may be the precursor of trouble in other ways, as by direct extension of the infection. These small branches of the large biliary tree play an inconspicuous but very important part in disease. They are often dilated (dilatation is pathological) and not uncommonly return to normal size after drainage.[10] If any method, then, can successfully reduce the degree of disease in this location it should be considered. It is suggested that heat perfusion might do this and that it might also tend to promote the return to normal function. This would be of great value in early cases because physiological changes play an important part in the production of symptoms; gall-bladder disease is not entirely a surgical problem.

3. *The common duct.*—In a certain percentage of cases where ductal stones are found at a second operation it is safe to say that the cleaning process (drainage) was not thorough at the first operation, even if considered satisfactory, and that repeated perfusion of the common duct with heat might have prevented the conditions which later necessitated operation and in some cases doubtless caused a fatality. Gray and his associates[12] have shown that mild, moderate, and intermittent states of biliary obstruction decrease liver efficiency. This has also been confirmed by others.[13, 25] Bollman and Mann have proved that the tremendous regenerative power of the liver, and therefore a normal reserve, is dependent upon the patency of the bile passages as well as upon a good blood supply. The obvious clinical application is that every effort should be made to produce and maintain a clear bile pathway post-operatively. This effort is made in many cases, but is not always successful. Continuous "downhill" drainage may improve the end-results of these efforts. Abnormal conditions of the common duct, in the absence of jaundice, fever, chills or colic, should not be forgotten, because there *must always be a precalculous state of long-standing.* It is in this embryological age of stones that treatment should be concentrated, because prevention is better than cure, even when cure is possible.

4. *Pancreatitis.*—It is well known that infection from the biliary tract is carried by the lymphatics to the pancreas,[11] and that chronic pancreatic disease is not uncommon in biliary tract disease.[8] Walters and Wesson[24] and others have shown that a persisting pancreatitis can be demonstrated by x-ray. It is revealed by a narrowing of the lower common duct as it passes through the pancreas, and some degree of dilatation above this constriction. It is now recognized that this might be a cause of both pre- and post-operative colic, as suggested by McGowan, Butsch and Walters,[20] and that prolonged drainage of the common duct is definitely indicated in such cases.[25] It is also recognized that pancreatitis might be the cause of non-colicky abdominal pain following cholecystectomy, as well as the cause of some of the symptoms before operation. Judd[15] found that the continuation or recurrence of symptoms in 24 cases with second operations was due to infection in the pancreas or liver or both. Most of the cases were permanently relieved by drainage of the duct. (Although not mentioned, it is assumed that drainage must have been of long duration.) Hence the importance of as thorough and complete drainage as possible at the first operation. It is suggested that continued perfusion with heat, solvents, or antiseptics might accomplish this more satisfactorily than the present methods, and that it might therefore diminish the incidence of such pancreatic disturbance. This procedure can be performed through the gall bladder stump where preferable. In health the lymph drainage from the gall bladder flows to the cystic gland along the cystic duct, and thence along the common duct to the receptaculum chyli; but this drainage is detoured into the pancreatic plexus when the common duct becomes abnormal. Therefore any procedure which will help to produce a normal common duct or will improve the lymph circulation should theoretically benefit the pancreas.

5. *Dilatation of the sphincter.*—Continuous or repeated perfusion will produce a slow, and possibly a permanent, dilatation of the sphincter. After three months' perfusion saline flows through the sphincter without any relaxing medication at a very much lower pressure (less than half) than is originally necessary. This demonstrates that the sphincter is less resistant, if not dilated, for the time being at least. This might be an advantage over acute surgical dilatation, the end-results of which are still

under discussion.[1, 2, 3, 6, 28] Some workers deny that the sphincteric mechanism has any significant function.[26] This is not true.

6. *Post-operative colic.*—Regarding symptoms after cholecystectomy (particularly functional colics), it has been found at the Mayo Clinic[25] that ". . . among the surgical measures which have been advocated, that which has been most widely and successfully used is long-continued drainage of the common bile duct with a T-tube. Instrumental dilatation of the sphincter has also been attempted with unsatisfactory results. Apparently the presence of the tube eventually produces some sphincteric incompetence and may thus lead to permanent relief. . . ." If this is true, and it doubtless is, then *an improvement in drainage must result in an improvement in post-operative symptoms.* If sphincteric incompetence will decrease the incidence of functional colic, and if repeated perfusion produces a sphincteric incompetence, then it follows that repeated perfusion might likely prevent such colic. In other words, a surer way of producing an incompetence must of necessity lead to a decreased incidence of colic.

7. *Examination of ductal washings.* — The procedure can be fully evaluated by examining the cleansing fluid after collection through a nasal tube[19] (Fig. 2).

COMMENT

Because no surgical procedure offers the patient the greatest likelihood of "cure", the lowest percentage of complications, and the lowest ultimate mortality and morbidity, unless it removes all the disease possible, and unless the ductal system is left as normal as possible by drainage,[17] the accompanying technique may prove to be of benefit in selected cases, particularly those in which drainage of the hepatic ducts is indispensable.[26] This report is presented prematurely because the results obtained in a small series of cases were so uniformly good, and because a general practice does not permit the clinical investigation necessary to prove its practical worth. These cases have only served to show its *immediate* practicability, *i.e.*, that perfusion does cleanse the ducts more thoroughly than the present drains, and that controlled heat can be applied directly to the interior of the biliary tract. What the end-results of perfusion will be can only be determined by further work, but the suggestion of any improvement must be duly considered and discussed before being discarded, because such discussion of itself may provide the real improvement.

The production of varying degrees of pain, in general, agrees with the findings of Morley,[22] Zollinger[27] and Layne and Bergh.[18] Pressure on the distended bladder produces a sharp severe pain at the point of pressure, no matter the position of the patient (Morley's peritoneo-cutaneous reflex). The sudden withdrawal of the piston during a syringe lavage produces a severe pain, more sharp and more penetrating than that produced by filling the bladder.

Saline at a temperature of 110 to 115° F., as recorded 4½ inches from the entrance into the biliary tract, has been used as the perfusion medium for periods of one-half to three-quarters of an hour with no untoward effects. The heat is gradually raised, starting at 90 to 95° and reaching approximately 110° in 15 minutes. It is continued at between 110 to 115°. The effect of heat in relaxing a hypertonic sphincter is illustrated in the case of Mrs. S., aged 31. Four weeks after operation this patient experienced a sharp severe epigastric pain, increasing in severity and radiating directly through to the back between the scapulæ. Nausea and vomiting were moderate and common duct stones were absent, as shown by cholangiogram. Perfusion with heated saline gave relief. On the other hand cold saline gives a mild colicky pain, presumably due to spasm.

SUMMARY

1. A simple procedure has been outlined whereby (*a*) the ductal system is thoroughly cleansed or "flushed" by means of the ordinary continuous intravenous apparatus, and (*b*) controlled heat can be applied directly to the internal biliary tract.

2. The application of heat to the interior of the biliary system is practical, and of great theoretical value.

3. The tone of the sphincter of Oddi and the nervous balance of the important choledocho-duodenal mechanism can be determined.

4. The value of the cleansing procedure is increased by watching and examining the ductal washings collected through a duodenal tube.

5. Solvents or antiseptics can be used instead of saline for the continuous washing if necessary.

6. One of the absolute requirements for successful biliary tract surgery, namely, the establishment and continuity of a free flow of bile

into the intestinal tract, is more likely to be fulfilled by "downhill" drainage along the normal natural bile drainage system and by heated irrigations than by "uphill" drainage only.

7. These methods, by tending to improve the lymph flow, may prevent pancreatic involvement, which is often a cause of post-operative symptoms.

8. The sphincter seems to be slowly dilated; this may be an advantage over sudden surgical dilatation.

9. It is suggested, and early work indicates, that heat perfusion will give better end-results than the present methods of drainage.

Appreciation is expressed to Mr. Hevran, of the Baxter Laboratories, Toronto, who supplied the intravenous fluids for this study. The heating jacket was made by Ingram & Bell, Toronto, through the kindness of Mr. Wheeler.

ADDENDUM

Because poor results must be reported as faithfully as the good ones, a case is noted in which perfusion did not produce a complete cure. This patient, who had a very satisfactory post-operative recovery from a long-standing illness, returned for consultation since this paper was submitted and presented the classical signs and symptoms of a common duct calculus. She had had six months of complete relief. The obvious questions are: would the accepted common duct drainage or an earlier operation have prevented these post-cholecystectomy symptoms? and what would have been the result of early operation and perfusion? Does this failure condemn the procedure? The present complaint is very unlike the original which is still absent. This stresses a point made elsewhere, namely: that disease of the gallbladder and disease of the ductal system, although so often—if not always—present together, are really separate entities. However, their *treatment should not be separate.*

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READING WHILE EATING INADVISABLE.—To read during a meal for the purpose of preventing fast eating amounts to using one unhygienic procedure to correct another, *Hygeia, The Health Magazine* states in answer to an inquiry. "The sight, smell, taste and thought of appetizing food have a favourable effect on digestion; anxiety and lack of interest in food have an unfavourable effect. Digestion proceeds best when one eats at ease or is at peace with himself and the world. Very few persons can read and at the same time enjoy their food. It is true that reading certain subject matter tends to relax and relieve tension. Ideally, anything that relaxes one, such as reading, singing, taking a short walk or observing a period of quiet should come before or after the meal. During the meal, attention should be focused chiefly on the appetizing qualities of the food."

HYPERTENSION IN A GIRL OF 12, ASSOCIATED WITH UNILATERAL, CHRONIC, ATROPHIC PYELONEPHRITIS; TREATED BY NEPHRECTOMY*

BY FRANK S. PATCH, L. J. RHEA AND J. T. CODNERE

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FOR many years it has been recognized that pyelonephritis, polycystic kidney, hydronephrosis, as well as the results of other types of urinary obstruction may be followed by hypertension. Most people thought that a bilateral lesion must be present before hypertension resulted. The few reported cases of unilateral nephropathy that were followed by a disappearance of hypertension caused little or no stir. It was the work of Goldblatt,[9, 10, 11] in the experimental production of hypertension in dogs by constricting the arterial blood supply to one or both kidneys, which stimulated awakening of interest by urologists in the relation of disease of the urinary organs to hypertension, and particularly that form which was thought to be dependent upon a unilateral nephropathy. Though Quinby[21] in 1923, and Crabtree[6] in 1927 had each reported a case of hypertension in which the removal of a diseased kidney had been followed by a decrease of the hypertension, it was not until Butler's[5] report of a series of cases, in 1937, that the subject began to be actively studied. Since Butler's report numerous authors have recorded similar cases, and the literature on the subject is rapidly increasing. We propose to briefly review the reported cases in which a notable improvement in the hypertension has followed the removal of a kidney that had been said to be the site of unilateral disease. To these, we are adding a case of our own, though the time elapsed since operation is still too short to determine whether the striking fall in blood pressure will be permanent.

CASE REPORT

J.D., a girl of 12, with hypertension, who was found to have a unilateral atrophic pyelonephritis, has been apparently relieved of her hypertension by nephrectomy.

At the age of 18 months she had an illness lasting a few days, which was accompanied by right loin pain and high temperature. A diagnosis of pyelitis was made. Since that time, during a period of 10½ years, she has had intermittent illnesses, with nausea, epigastric pain, and malaise. While no positive diagnosis can be made, it is highly probable that on these separate occasions she suffered from pyelonephritis. No urinalyses were made. Apart from these illnesses she had pneumonia, measles, chicken-pox and mumps. At 6 years she had typhoid. At this time pus was found in her urine.

At the age of 7 years, when she was in the Children's Hospital in Winnipeg, she was cystoscoped because of a pyuria of four months' standing. Day and night frequency and lumbar pain had been present for three years. The urinary bladder was inflamed, the left ureteral orifice was red and puffy. The right kidney urine contained clumped pus. The left kidney urine was normal. *B. Coli* was cultured from the common, the right and the left kidney urines. The right kidney pelvis was lavaged with mercurochrome.

After this examination, her health improved and she was well until November, 1939. On November 11, 1939, she complained of a dull ache in her left loin, thought to be due to a recent injury. On November 13th she complained of severe occipital headache. Within the next 24 hours she was seized with several short convulsions, became unconscious, and was admitted to the Woman's General Hospital in Montreal. There were no urinary symptoms.

It was here that a hypertension of 170/120 was noted for the first time. Cystoscopic and pyelographic studies were made showing an atrophic right kidney and a large left kidney. The diagnosis of right renal ischæmia was made. On December 4, 1939, she was transferred to the urological service of the Montreal General Hospital.

Upon admission, the patient was thin, somewhat listless, and weighed 71½ pounds. The temperature was 99.4, and the pulse 118. Blood pressure was 162/150. Her heart was not enlarged. The second sound was noted as being "sharp and snapping", most distinct in the aortic area over the sternum. The fundi were normal. There was no peripheral œdema. The blood Wassermann test was negative.

Urinalysis (catheter): specific gravity 1.016, acid, no albumin, sugar or red blood cells, and only a rare pus cell; culture showed *Staph. albus.*

Blood count: red cells 4,890,000, white cells 7,700, hæmoglobin 90 per cent. X-rays of the urinary tract were negative for calculi. While an enlarged left kidney was noted, no shadow was to be seen on the right side. A chest film showed the heart to be normal in size. The electrocardiogram showed normal axis and conduction time. Blood chemistry: urea nitrogen 18 mg. per 100 c.c., creatinine 1.5 mg. per 100 c.c., urea concentration factor 49, corrected 37.

Intravenous pyelography: "The left kidney pelvis is large, otherwise normal. The right pelvis is very much smaller, with outlines of pelvis and calyces indistinct" (Fig. 1).

Cystoscopy, December 13th: Bladder and ureteral orifices normal. Both ureters catheterized. There was a good flow of urine from the left kidney, a very scanty flow from the right. A rare pus cell was noted in the urine from the right kidney. Right kidney urine, *B. coli;* left, no bacterial growth.

Pyelography: The left pelvis, apart from increased size, was normal. The right pelvis and calyces were much smaller than the left. Its calyces were flattened (Fig. 2).

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A second cystoscopy was done on December 18th, and catheters left inlying, in order to make further functional studies. The procedure was not satisfactory, and it was followed by an exacerbation of urinary infection. During her stay in hospital before operation, a period of 23 days, daily blood pressure readings were made. The blood pressure varied between 180 and 140 systolic, and 135 and 105 diastolic.

A right nephrectomy was done on December 27th.

The pathological report was as follows: "The specimen consists of a kidney, a portion of the ureter and renal artery. Fat is attached to the kidney, to

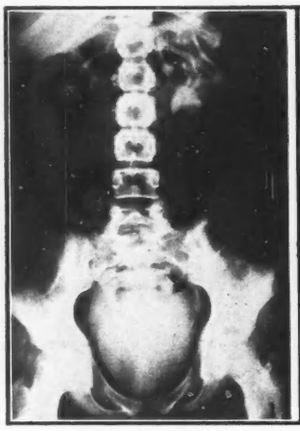


Fig. 1
Intravenous pyelogram.

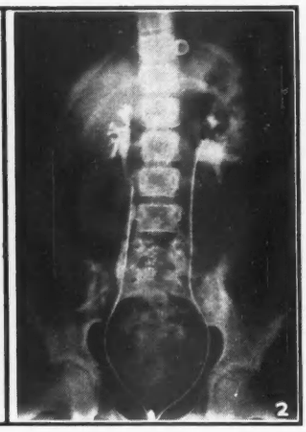


Fig. 2
Retrograde pyelogram.

the ureter, and to the pelvis. This fat shows an increase in its connective tissue and it is quite firmly attached to the kidney, the pelvis and the ureter, and its blood vessels are prominent. The fat is carefully removed, doing as little damage as possible to the kidney during its removal. When this adherent firm fat is removed, the following is seen. The kidney weighs 23 grams; it is 5.5 cm. long x 1.5 cm. wide x 2 cm. thick (Fig. 3 and 4a). The general outline and contour of the organ are that of an atrophic kidney rather than that of a congenitally small kidney. The consistency of the kidney pelvis and the ureter is definitely increased. Before the partial removal of the capsule for more careful study, the following is seen; the kidney surface shows numerous narrow intersecting depressions which divide the organ into irregularly shaped areas of varying size, the largest of which is 1.5 cm., and the smallest only a few millimetres wide. A portion of the capsule is removed in order to more carefully study the kidney. This capsule is adherent to the kidney substance, and even when the greatest care is taken in its removal small bits of kidney substance are adherent to it. The capsule-free kidney shows depressed intersecting lines which correspond to those seen and described before the capsule was removed. These intersecting lines, as already noted, divide the kidney substance into large and small areas. Besides this gross division into irregularly sized areas, the kidney shows a fine and gross stippling.

"The kidney, the pelvis and the ureter are carefully bisected in order that these organs may be more carefully studied (Fig. 4b). The surface of the bisected kidney is very irregular, the kidney substance is very pale, very definitely increased in consistency, and has lost its normal anatomical markings. No distinction can be made between cortex and medulla. The kidney substance varies in width; it is narrower at the two poles and is thickest in its mid portion. In the mid portion the kidney is 1.5 cm. thick, its upper pole 3 mm. thick, and its lower pole 3.5 mm. thick. The blood vessels within the kidney cannot be made out with certainty.

"The kidney pelvis is greatly thickened and firm; it is almost hard and averages 2.5 mm. in thickness. The pelvis and calyces are definitely dilated. The dilatation of the calyces is most marked at the upper and lower poles. The inner surface of the pelvis, as well as the dilated calyces, shows a gross stippled appearance. The ureter is patent, its wall is thickened and increased in consistency, and its mucous membrane is thrown into parallel longitudinal folds.

"The following microscopic description is based upon the study of numerous sections taken at various places in the kidney and stained with differential stains.

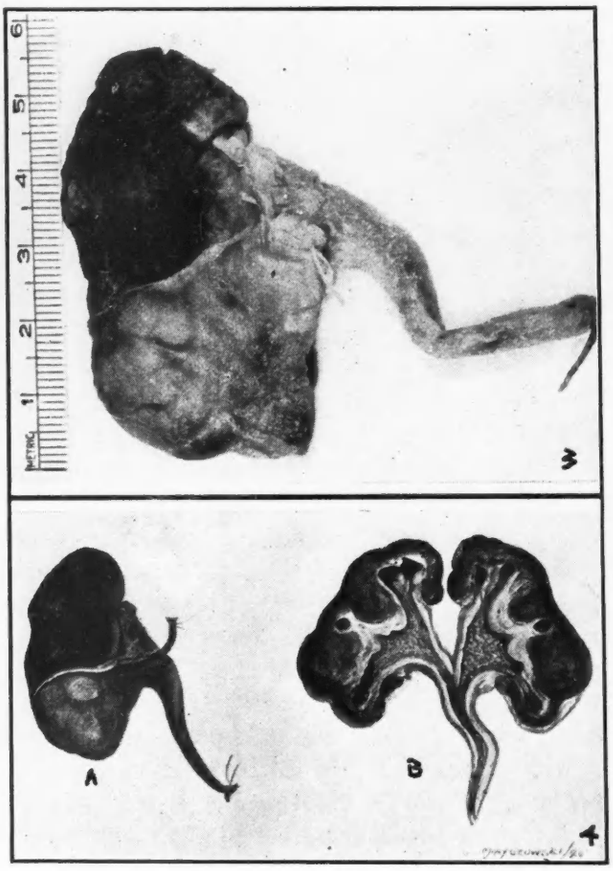
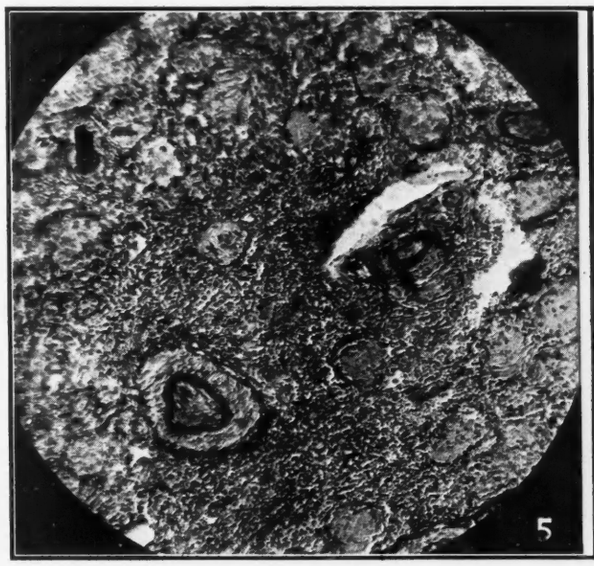


Fig. 3.—Photograph of gross specimen. The capsule has been partially removed to show irregularity of the surface. **Fig. 4**—(A) Photograph of drawing of gross specimen with capsule partially removed. Note irregularity of surface. (B) Specimen bisected. Note.—(1) atrophy of the kidney; (2) hydronephrosis; (3) chronic pyelitis. The stippling of the mucous membrane is well shown; (4) chronic ureteritis.

"The kidney shows pathological lesions throughout its entire substance, but not always to the same degree. The most marked lesions are at the upper and lower poles, and the lesions are less marked in the central portion of the kidney where gross damage to the kidney is less pronounced (Fig. 5). The kidney poles show a practically complete destruction of the tubules with extensive fibrosis of the glomeruli, an increase in connective tissue and marked chronic inflammation. The kidney substance is destroyed to such a degree that a number of glomeruli are seen under the low power of the microscope. There is only an occasional tubule. These are small and their epithelial lining shows evidence of destruction, and some contain a cast-like material. The mid portion of the kidney shows the least microscopic change, as it does the least macroscopic change (Fig. 6). There are areas which show little change save some general increase in connective tissue. The tubules and the glomeruli are



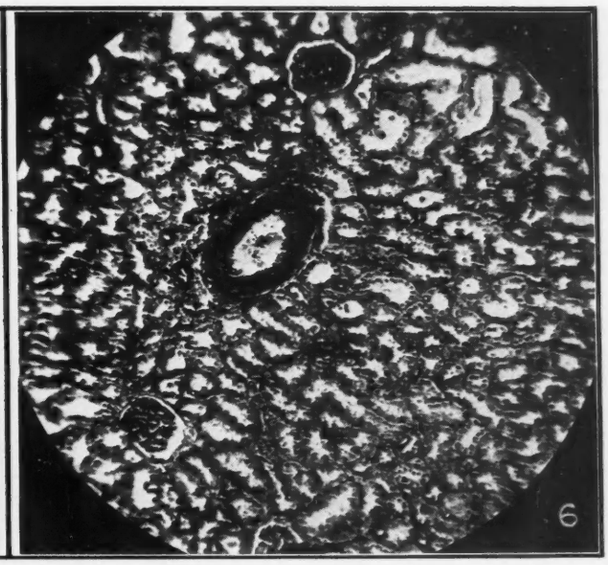


Fig. 5.—Photomicrograph of kidney from an area showing extensive damage.

Note (1) Sclerosis of glomeruli.

(2) Complete disappearance of tubules.

(3) Marked fibrosis.

(4) Chronic inflammation.

(5) Arteriosclerosis of the larger arteries.

Fig. 6.—Photomicrograph of a well preserved area of kidney. There is only a very slight fibrosis.

Fig. 7.—Photomicrograph of an area of kidney and pelvis. Note the chronic inflammation, muscular hypertrophy, thickening of the epithelium and papillary infolding.

well preserved, and the blood vessels in contrast to those elsewhere in the kidney show little arteriosclerotic change. There is no arteriolar sclerosis. Judging from the microscopic study of the central portion of the kidney, it was probably able to function to some degree. The arteries within the kidney substance at the two poles show extensive arteriosclerotic changes similar to those found in the arteries in the floor of a chronic gastric ulcer. The pelvis is thickened, its muscle is hypertrophied, there is increase in its connective tissue, and marked chronic inflammation (Fig. 7). The mucosal surface shows marked thickening of the epithelial lining. In some places it is heaped up, leading to protrusions into the pelvis. In other places, papillary projections lined with thickened epithelium extend into the kidney pelvis, giving the gross stippled appearance to the mucosa already described. While there are no areas of definite leukoplakia, the lining epithelial cells of the pelvis show, in places, pre-leukoplakic changes. The ureter shows fibrous thickening of its wall, as well as chronic inflammation.

"Diagnosis: chronic pyelonephritis with secondary atrophy of the kidney; arterio-sclerosis; hydronephrosis; chronic ureteritis."

Prior to the operation her blood pressure had averaged 160/115, with occasional rises of 15 to 20 points higher. During the operation, blood pressure readings were taken at five-minute intervals. There was no appreciable change in the blood pressure up to the time she left the operating table. It ranged between 150 and 180 during the operation. One hour afterwards it was 150; two hours after operation it was 115/95. During the next 24 hours, the systolic pressure averaged 125. At this time, following an intravenous infusion of dextrose saline, there was a rise of the blood pressure to 165/130, and 12 hours afterwards it was 170/125. During the next 24 hours it gradually fell to 120/90. In the following week it averaged 110/90, and one week later it fell to 100/70. Her convalescence was without incident, and she was discharged from hospital seventeen days after operation. The blood pressure seemed to be stabilized at 90/60.

Since leaving the hospital she has remained well, and without complaints. On the date of her last examination, on June 4th, she had gained 20½ lbs. in weight. Observations of her blood pressure, for which we are indebted to Dr. E. Craig, of St. Lambert, Que., and Dr. E. B. Potts, of St. Thomas, Ont., have

been made as follows: February 28th, 94/60; March 25th, 106/68; April 30th, 110/70; June 4th, 96/60 (Chart 1).

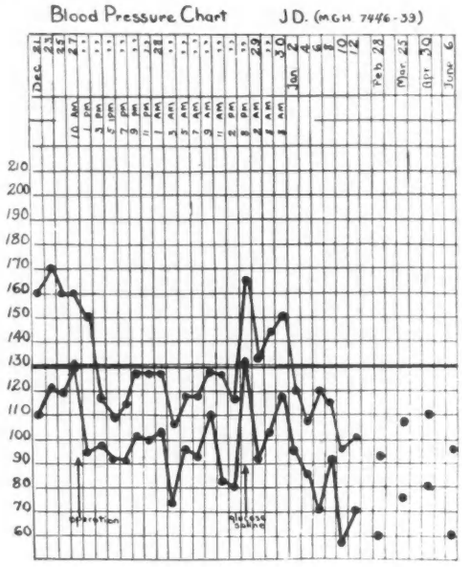


Chart 1.—Blood pressure readings.

We have collected from the available literature 22 cases in which unilateral nephropathy has been associated with hypertension and in which a definite improvement followed nephrectomy. With our own case the total is 23. Numerous other cases have been mentioned, but with insufficient data to warrant inclusion. For example, Crabtree,[8] mentions 11 unreported cases occurring in Boston. Doubtless there are many others. Moreover, many cases have been noted of unilateral nephropathy associated with hypertension in which nephrectomy was followed by only a temporary reduction of the blood pressure readings. In one case of ours, a man of 36, investigated in 1932 for hæmaturia, was found to have a blood pressure of 180 to 210/120. The kidney was found to be atrophied and hydronephrotic with a thin scarred cortex, the so-called atrophic pyelonephritis. Nephrectomy was followed by a drop in the blood pressure of 50 points. Unfortunately we have been unable to locate him since he left hospital, and his subsequent condition is unknown.

Of the 23 cases referred to above 5 occurred in children of 12 years and under, 3 were in the twenties, 8 in the thirties, 3 in the forties, 2 in the fifties, and 2 were adults of unstated age. Eleven patients have been followed for more than a year. One case has been observed for 11 years. For ten years after operation the blood pressure in this latter case remained within the normal limits, but recurrence of the hypertension was noted in the eleventh year. The other cases, as our own, have not been observed long enough to warrant any definite conclusions being drawn. Crabtree makes the sound observation that the term "cure" after surgery should be used with reservation.

The renal lesions in the reported cases are very variable. In 3 congenital anomalies were present. Hydronephrosis was noted in 8 cases. Pyelonephritis was noted in 11 cases, 7 of these being described as atrophic pyelonephritis.

From this it would appear, clinically at least, that hypertension may result from a unilateral nephropathy, and that the removal of the diseased kidney will often be followed by a lowering of the blood pressure. This idea, however, is not supported by the experimental work of Goldblatt. Working on dogs, he was unable to produce a hypertension other than a transient one when the renal artery of one side alone was constricted. To produce permanent hypertension it was necessary to constrict the renal arteries on both sides. This suggests that in these reported cases the lesion may in reality be bilateral. The recurrence of the hypertension subsequent to operation tends to support this view. However, Wilson and Byrom,[24] working on rats, were able to produce a permanent hypertension when one renal artery alone was constricted.

It has been suggested that the hypertension in dogs following experimentally produced ischæmia of the kidney might be due to some toxic substance or substances produced in the ischæmic kidney. This hypothesis has received support from experimental work of several kinds. The following experiment supports this view. If the blood vessels of an experimentally produced ischæmic kidney of a living dog that shows hypertension are joined to the blood vessels of a normal dog, this latter animal will show hypertension. As a result of this direct vascular connection, hypertension-producing toxic substances formed in the ischæmic kidney will be washed, as it were, into the circulation of the normal dog, and hypertension will result in the normal dog. This suggested toxic substance (pressin) may act directly or even indirectly on the complex vaso-motor system of the arteries, leading to their constriction and hypertension of a compensatory nature. Such a theoretical explanation has the advantage of simplicity, but the mechanism probably is not to be explained upon such a comparatively simple physiological basis.

While many of the clinical cases have been observed for a considerable period of time to be free from hypertension, there remains a suspicion, confirmed in some of the cases, that the hypertension will recur at a later date. Before any definite conclusions may be drawn from nephrectomy a much longer period of observation will therefore be necessary.

There are many difficulties that stand in the way of arriving at any definite conclusions as to the relation between certain kidney lesions, especially pyelonephritis, and hypertension, as well as the immediate and especially the final results of a nephrectomy upon the hypertension. These difficulties will remain until the basic relation between hypertension and a special group of kidney lesions with which it is associated is more thoroughly understood. It has been pointed out by many writers that the association of pyelonephritis, unilateral or bilateral,

SUMMARY OF REPORTED HYPERTENSIVE CASES IMPROVED BY NEPHRECTOMY

Reported by	*Age*	*Sex*	*Pre-operative range of blood pressure*	*Post-operative range of blood pressure*	*No. of months followed*	*Renal lesions*	*Remarks*
Butler[5]	7	M.	168/110 – 122/90	115/75 – 100/70	20	Pyelonephritis	Moderate arteriolar sclerosis of kidney.
	10	F.	190/120	110/79 – 92/60	3	Pyelonephritis. Dilated pelvis.	Marked arteriolar sclerosis of kidney.
Barker and Walters[1]	42	M.	200/140 – 170/120	144/100 – 128/90	2	Atrophic pyelonephritis.	Thickened arcuate and interlobar arteries. Scarring of kidneys.
Leadbetter and Burkland[14,15]	5½	M.	174/120 – 132/82	120/74 – 96/70	24	Ectopic kidney. Partial occlusion renal artery by plug of smooth muscle.	No intrarenal vascular disease.
Boyd and Lewis[4]	31	M.	225/140 – 165/100	150/100 – 125/75	6	Infarction of kidney.	Narrowing of renal arteries.
Crabtree[7]	27	F.	210/ ? – 180/ ?	190/ ? – 120/76	134	Chronic pyelonephritis. Stricture of ureter.	Return of hypertension 11 years postoperatively.
	40	M.	170/120 – 100/72	120/98 – 100/70	2	Calculi. Pyelonephritis.	Narrowing of intrarenal arteries.
Barney and Suby[2]	10	F.	200/170 – 185/130	110/70 – 98/60	21	Pyelonephritis with atrophy.	Marked renal vascular disease.
McIntyre[16]	35	M.	180/104 – 168/94	150/94 128/78	9	Pyelonephritis. Double kidney. Hydronephrosis.	Narrowing of main renal artery by arteriosclerosis.
Nesbitt and Ratliff[18]	37	M.	210/ ? – 180/110	150/100 – 120/90	14	Pyohydronephrotic atrophy.	Advanced sclerosis of large and small arteries.
	35	M.	200/110 – 185/110	140/90 – 140/89	9	Pyohydronephrotic atrophy.	Marked sclerosis of arterioles.
	51	F.	180/100	120/80	8	Far advanced tuberculosis of kidney.	Marked sclerosis of many of arteries of kidney.
	58	M.	205/110 – 190/ ?	155/110 – 150/110	½	Large cyst upper pole of kidney.	Thickened vessels. Nephritic changes.
	47	F.	190/120	120/95 – 100/60	½	Chronic purulent pyelonephritis. Hydronephrotic atrophy.	Arteriosclerosis in areas of scarring.
	24	M.	170/110 – 165/100	146/74 – 130/64	5	Chronic purulent pyelonephritis. Pyohydronephrotic atrophy.	Kidney showed no vascular changes.
Schroeder and Fish[23]	33	M.	212/150 – 190/138	150/100 – 120/80	16	Marked hydronephrosis and hydroureter.	Minimal arteriolar sclerosis.
	20	F.	240/150 – 194/120	150/100 – 120/90	11	Hypoplasia of kidney.	Early arteriolar sclerosis.
Oppenheimer[19]	?	M.	200/130	140/100	16	Atrophic pyelonephritis.	Arteriolar hyalinization.
Kerr[13]	?	F.	200/100+ – 150/100+	130/85 – 120/85	24	Embryonic kidney.	
Hyman[12]	30+	M.	220/120 – 180/100	140/90	12	Pyelonephritis. Hydronephrosis.	Renal artery marked sclerosis.
Morton[17]	34	M.	210/ ? – 180/ ?	122/84	12	Hydronephrosis.	
Bartels and Leadbetter[3]	37	F.	200/128 – 170/115	140/100 – 120/90	10	Hydronephrosis non-infected.	Slight arterial thickening.
Patch, Rhea and Codnere	12	F.	170/120 – 160/115	110/70 – 96/60	6	Atrophic pyelonephritis.	

with hypertension is not a constant one, nor is the relief of the hypertension a foregone conclusion after nephrectomy.

It is clear, in the present state of our knowledge, that extreme caution should be exercised, and that excessive haste to resort to surgery should be discouraged. Many kidneys have already been sacrificed unnecessarily on this new altar. Patients with hypertension in whom an unsuspected urinary abnormality has been found have been subjected to nephrectomy without any improvement. One worker in this field has informed me that he knows of ten such cases nephrectomized purely for the hypertension. In only one case was any success attained.

The greatest caution must be exercised in patients with a unilateral renal lesion associated with hypertension. While there is evidence that a good result has been attained in some cases, in others there has been temporary benefit only, followed by subsequent appearance of the hypertension. In other cases no improvement, even temporary, has been secured. In the present experimental stage of our knowledge, there should be a very definite indication that renal damage is present, and that this appears to be more marked on one side than on the other before nephrectomy is undertaken. In other words, the indication for radical operation should be based on urological grounds rather than on those of the hypertension.

This view is strongly advocated by Crabtree[8] who states that there are at present insufficient data on the relation between pyelonephritis and hypertension to justify any radical departure from present conservative renal surgery.

Schroeder and Fish[23] have tabulated the criteria for selection of cases suitable for this form of therapy: (1) the onset of the hypertension should be known to have occurred within two years; (2) the renal lesion should be confined to one kidney, which should show definite loss of function; (3) retinal changes should be minimal.

The need for caution is the more important in view of the frequent association between cases of hypertension and urinary abnormalities. In 71 cases of essential hypertension in relatively young people, Schroeder and Steele[22] found 50 in whom some abnormality of the kidneys or ureters was present. Palmer[20] in a personal communication states that in 212 cases of hypertension studied by him 47 were found to have significant deformities of the kidney, pelves or ureters, 33 being unilateral.

Schroeder and Fish[23] express the opinion that the inference that can be drawn from all the information now available constitutes an unsatisfactory basis for drawing definite conclusions on the value of this operative procedure. With this we agree.

Palmer, in a personal communication, states that there is a greater chance of success if the operation is done soon after the onset of the hypertension. Better results are obtained if the patients are young, and before other factors, such as age, etc., have not become effective.

None the less, the subject offers a definite challenge, to use a popular expression, not only to the internist but to the urologist. In spite of the doubt still present as to the efficacy of operative procedures in hypertension cases there is evidence that the hypertension may be ameliorated by nephrectomy in a small group of cases. The internist must also bear in mind the possibility of some urological condition playing a rôle in the production of hypertension, especially in the younger age group. This fact justifies the employment of thorough urological studies in the hypertensive patient. In either case radical operative procedures should be resorted to only after most thorough investigation and careful deliberation.

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THE NEPHROTIC SYNDROME WITH HYPERTENSION IN DIABETES MELLITUS

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IN a systematic survey of renal lesions Kimmelstiel and Wilson[1] noted a group of 8 cases in which peculiar and distinctive glomerular changes were present. The clinical records of these patients showed that, with one exception,† all had diabetes of long standing, most had hypertension, all showed some degree of renal impairment with massive albuminuria, but the outstanding clinical feature was extensive œdema of the nephrotic type which was out of proportion to the degree of heart failure present. To the histological changes found in the glomeruli of this group Kimmelstiel and Wilson gave the name "intercapillary glomerulosclerosis".

Anson[2] reviewed the kidneys in 900 consecutive autopsies and found 6 cases with glomerular lesions similar to those described by Kimmelstiel and Wilson. Of this group only two cases showed the nephrotic syndrome, although all had diabetes, hypertension, and some degree of renal impairment. Recently, Newburger and Peters[3] reported upon a series of nine cases with the clinical syndrome of diabetes, hypertension and albuminuria. Of this group four cases were autopsied and in each of these changes in the glomeruli similar to those originally described by Kimmelstiel and Wilson were present. Derow, Altschule and Schlesinger,[4] in the same month reported a single case. Two cases which fulfill both the clinical and histological criteria of what appears to be a disease entity furnish the basis of this report.

CASE 1

S.C., a 65-year old Jewish male, was first admitted on May 25, 1935. He had been known to have diabetes for 10 years. Early in May he developed a perforating ulcer on the plantar surface of the right great toe.

Physical examination revealed a blood pressure of 235/110 mm. Hg. with slight enlargement of the heart to the left. The ocular fundi show tortuosity of vessels with old and recent hæmorrhages. At this time there was pitting œdema of the legs to the knees. There was a penetrating ulcer on the plantar surface of the right great toe.

Laboratory examination. — **Urinalysis:** specific gravity 1.022, no albumin, sugar 3+. The sediment contained an occasional granular cast, pus and red blood cell. The Mosenthal test showed normal concentrating power. His blood sugar* was 300 mg., cholesterol 273 mg. and the blood non-protein nitrogen and urea levels were normal. The electrocardiogram showed left ventricular preponderance and questionable myocardial damage.

Clinical course.—His diabetes was brought under control by diet and insulin and the ulcer on the toe improved. He was discharged on July 1, 1935.

He was readmitted on March 30, 1936, following an upper respiratory infection, after which he developed gradual swelling of the legs, scrotum, arms, face and abdominal wall.

Physical examination at this time showed anasarca. The blood pressure was 180/90 mm. Hg. with a slight systolic murmur at all precordial areas.

Urinalysis: albumin 4+, sugar 3+, no ketone bodies, 5 to 8 red blood cells and 6 to 8 white blood cells per high power field, and occasional hyaline and granular casts. The Mosenthal test showed a fixation of specific gravity 1.011 to 1.015 and the urea clearance test was 18.9 per cent of normal. Chemical examination of the blood showed elevated sugar levels, total blood protein 4.7 g.; non-protein nitrogen 30.8 mg., hypoalbuminæmia 2.98 g., an albumin-globulin ratio of 1.7 to 1, a cholesterol level of 306 mg. and a creatinine of 1.33 mg.

The diabetes was brought under control and the patient was given posterior pituitary extract (25 grains in 5 days). Under this regimen his urinary output increased. Within two weeks he lost 40 lbs. in weight and the œdema disappeared. The urine continued to have a low specific gravity and a high albumin content, and upon discharge on April 22, 1936, his blood chemistry showed a non-protein nitrogen of 40 mg.; urea 63.3 mg.

He was admitted for the third time on August 6, 1936, because of a cerebral vascular accident with right hemiparesis. At this time his blood pressure was 220/94 mm. Hg. The urine had a specific gravity of 1.020, albumin 3+ and a trace of sugar. There was slight anæmia (3,680,000 red blood cells per c.mm.). The stools gave a 3+ benzidine test but were negative for pathogenic bacteria or amœbæ. The blood chemistry showed urea of 104 mg., non-protein nitrogen of 54.3 mg. The blood Wassermann test was negative. He was discharged, slightly improved, on September 9, 1936.

The final hospital admission occurred on October 23, 1936. His blood pressure had fallen to 160/70 mm. Hg. The urine showed a fixed specific gravity of 1.012 with no sugar and 1+ albumin. Non-protein nitrogen was 166.6 mg. and creatinine 2.5 mg. The blood sugar was between 200 and 400 mg. He died on November 7, 1936.

Necropsy.—The right kidney weighed 220 grams and the left 210 grams. The organs were of the usual shape. The capsules stripped easily and a reddish-grey, finely granular surface was present containing a few small retention cysts. On the cut surface the cortex was narrowed (2 to 6 mm.) and there was a peculiar reddish streaking on both cortex and medulla. There was no increase in peripelvic fat and the pelves and ureters were not remarkable.

Microscopic examination of multiple sections of

* Director of Laboratories, Jewish General Hospital, Montreal.

† Death occurred 3 hours after admission and no history was obtained.

* All blood chemical examinations are reported in terms of grams or milligrams per 100 c.c. of blood.

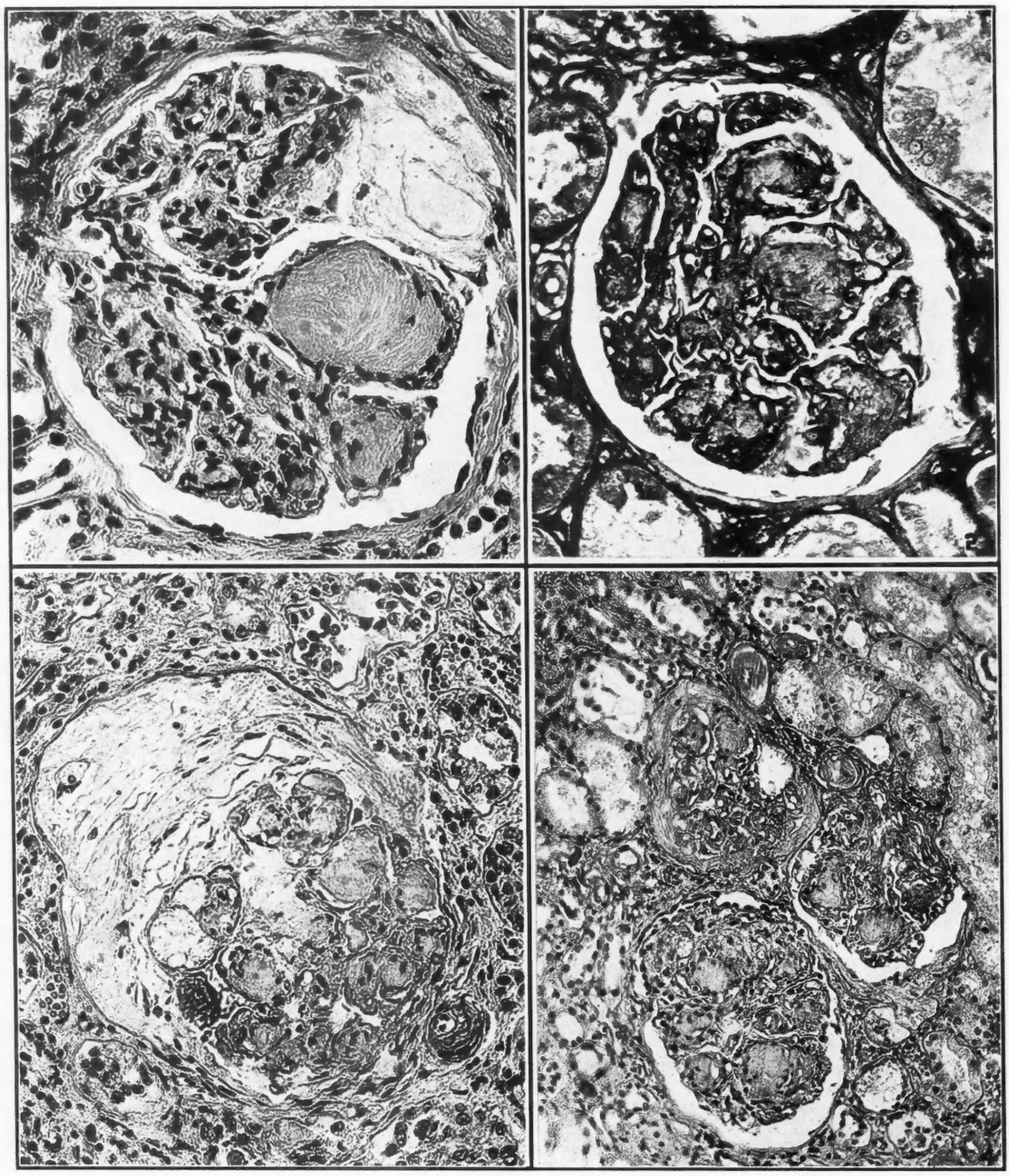

Fig. 1. Case 2.—Photomicrograph to show moderately severe involvement of glomerulus. It also shows lipid in Bowman's capsule. Note that the epithelium of Bowman's capsule is pushed into the glomerular space. Note also the vacuolization of the hyaline material and "pseudo" fusion between capsule and glomerular tuft. Stain, hæmatoxylin-eosin. **Fig. 2.** Case 2.—Photomicrograph to show that the peripheral capillaries are patent and that basement membranes of capillaries are thin, non-fragmented and delicate. Note the rather marked intercapillary deposit of lipo-hyalin. Lee-Brown modification of the Mallory aniline-blue stain. **Fig. 3.** Case 1.—Photomicrograph showing extensive involvement of glomerulus and Bowman's capsule with lipo-hyalin and the formation of a pseudo-crescent. Note also the arteriole which shows thickening of wall, reduction of the lumen and the lipo-hyalin in the media. Stain, hæmatoxylin-eosin. **Fig. 4.** Case 1.—Low-power photomicrograph to show three glomeruli with variable degrees of involvement. Note the three arterioles which show thickening of walls and the presence of lipo-hyalin in the medias. Stain, hæmatoxylin-eosin.

kidney showed widespread involvement of glomeruli by a peculiar and distinctive process which consisted of the deposition of a pink-staining, homogeneous and, at times, vacuolated, extra-cellular material in the glomerular tufts. This material appeared to lie between capillary loops and compressed the loops. It was pink-staining with hæmatoxylin-eosin, was acellular, and did not stain characteristically for amyloid with congo red or crystal violet. In many situations the homogeneous deposits contained fat vacuoles which stained with Sudan III, Scharlach R and osmic acid. This fat was variable in amount and was doubly refractile.

Under the epithelium of Bowman's capsule considerable deposits of similar material, but much richer in doubly refractile lipid, were seen. This deposit projected toward the glomerulus, carried the epithelium before it and in some places fused with the glomerular tufts to form pseudo crescents. No inflammatory exudate was seen in any glomeruli and there was no multiplication of endothelial cells. Sections stained by Mallory's aniline blue stain showed thin, delicate, non-fragmented capillary membranes and occasionally patent loops were seen which were compressed by intercapillary deposits.

All arterioles manifested severe thickening of walls and reduction of lumen calibre and in many, a medial deposition of lipo-hyaline material which was indistinguishable both morphologically and tinctorially from that seen between the glomerular capillary loops was present. In some glomeruli where the afferent arteriole was seen entering the vascular pole the material between capillary loops appeared continuous with and similar to that seen in the media of the arterioles.

The tubular epithelium presented moderately severe cloudy swelling with granularity, fraying, and occasional desquamation of epithelium. Sections stained for fat showed only small amounts in the epithelium of the proximal convoluted tubules and this was doubly refractile.

Microscopic sections of the pancreas showed slight post-mortem autolysis of acinar tissue. A few of the islands of Langerhans were the seat of interstitial hyalinization. The wall in the majority of the arterioles was thickened and the calibre of the lumen was reduced. A rare arteriole was encountered which showed lipid in the greatly thickened, homogeneous wall. No similar arteriolar changes were seen in any of the other organs examined.

CASE 2

D.B., a 65-year old Jewish female, was first admitted to this hospital in May, 1939, for the dietary control of her diabetes. She was known to have had diabetes for 15 years and had been taking insulin for the previous nine years.

Physical examination at this time was non-contributory, except for the blood pressure which was 158/100 mm. Hg. There was no peripheral œdema. The urine showed a 2+ albumin, with a specific gravity of 1.022, an occasional cast, and 4+ sugar.

She was readmitted in May, 1939, because of increasing dyspnœa and swelling of the legs for the previous three months.

Physical examination revealed dyspnœa at rest, œdema of the right breast, right arm, and both legs, and fluid at the bases of both lungs. Her blood pressure was 190/86 mm. Hg.; there were ascites and a questionably enlarged liver.

Urinalysis showed a specific gravity of 1.020, 2+ albumin, and an occasional granular cast and red and white blood cell. Her blood sugar was 300 mg., urea 64.0 mg., and creatinine 1.13 mg.

During this stay in hospital the chest was tapped several times and a total of 3,000 c.c. was removed. The œdema subsided slightly. She was discharged on June 18, 1939.

Her final admission was on September 5, 1939. The complaints were weakness, shortness of breath and gradually increasing swelling of the legs, arms, face, breasts and abdomen.

Physical examination revealed an obese, dyspnœic female, with tremendous œdema of legs, arms, face, breasts, sacrum and abdominal wall. There was slight dullness on percussion of the right chest posteriorly, and her blood pressure was 174/110 mm. Hg. The eye-grounds could not be visualized.

Laboratory examination.—Repeated urine examinations showed specific gravity between 1.010 and 1.020, 3+ to 4+ albumin, occasional granular casts, and 3 to 4 white blood cells per high power field. Sugar was 2+ but there were no ketone bodies.

The hæmoglobin was 70 per cent (Sahli) 3,200,000 red blood cells per c.mm., and 16,000 white blood cells. The blood sugar levels ranged from 52 to 512 mg. The CO_2 combining power was 47.3 volumes per cent. The total proteins were 5.5 g., serum albumin 2.9 g., albumin-globulin ratio 1.2 to 1, non-protein nitrogen 72 mg., cholesterol 187 mg.

Hospital course.—The right chest was tapped and 700 c.c. of clear, straw-coloured fluid was removed. The patient was placed upon a dietary regimen with insulin, but her diabetes was found difficult to control. She was given esedrone (a mercurial diuretic) for her œdema. She became comatose 17 hours after admission and developed signs of bronchopneumonia at the bases. Oxygen therapy was instituted. The patient died on the third hospital day.

Necropsy.—Each kidney weighed 130 grams. They were only slightly reduced in size. The capsules were œdematous, stripped with ease, and revealed a pallid, greyish-pink, finely and uniformly granular surface. The organs were slightly increased in consistency. Section showed a slight reduction in parenchyma, the cortex not being relatively as much reduced as the medulla. Cortical striations were apparent and the glomeruli appeared as pale, translucent, bloodless dots. Increased fibrous markings could not be seen in either cortex or medulla. There was a slight increase in peripelvic fat, but the pelves and ureters were not remarkable.

Microscopically, the predominant lesion was seen in the glomeruli. The change consisted of the deposition of a pink-staining, homogeneous, and acellular type of material between the loops of the capillaries in the glomerulus. Although this material separated one capillary loop from another, many of the loops appeared patent, but where deposits were extensive the loops were closed and the nuclei were enmeshed in the deposit. In some situations, fine and coarse vacuoles were seen in the intercapillary deposits. These changes varied considerably in the degree of involvement, in some glomeruli only a single loop being involved, while in others all loops and the vascular pole are affected. Congo red and crystal violet stains indicated that this extra-cellular deposit was not amyloid, and sections stained by Sudan III and osmic acid proved that the small vacuoles seen in the deposits were fat. With hæmatoxylin-eosin the intercapillary material stained red and was of a polychrome red and blue with Mallory's aniline blue. Zenker-fixed sections, stained by the Lee-Brown modification of the Mallory aniline blue stain, demonstrated that the basement membranes of the glomeruli were thin and delicate, showed no fragmentation, and many of the capillary loops remained patent, though separated from each other by this intercapillary material.

Many glomeruli showed a deposition of a foamy and vacuolated material in the connective tissue of Bowman's capsule which protruded towards the glomerulus and carried the epithelium of the capsule before it. In some situations changes in both capsule and glomeruli simulated the crescentic fusion seen in glomerulo-nephritis. The material in the capsule stained with Sudan III and with osmic acid, and was doubly refractile.

All arterioles were thickened and their lumina reduced. The thickening of the arteriolar walls was due to the deposition in the media of material similar

in appearance and staining qualities to that seen between the glomerular loops. Indeed, in some instances the foreign material could be seen extending from the media of afferent arterioles into the vascular pole and between the glomerular capillaries. The medium sized arteries showed considerable œdema, fibrosis and thickening of walls, but there was no medial deposition of lipo-hyalin.

The tubular epithelium showed moderately severe, cloudy swelling with granularity, fraying, and slight desquamation. The convoluted tubules showed moderate fatty degeneration, but the fat seen was not excessive and was doubly refractile.

Microscopic examination of the pancreas showed extensive fatty infiltration. The acinar tissue was fairly well preserved. The islands of Langerhans showed no significant histopathological changes. All arterioles showed thickening of walls and reduction of lumen calibre, and an occasional arteriole was seen containing lipo-hyalin similar in appearance and staining quality to that encountered in the glomeruli.

DISCUSSION

The lesions present in the glomeruli of these and other reported cases show features which indicate that they are degenerative in nature. The fundamental lesion consists in the deposition of an acellular, homogeneous, hyalin-like mass containing variable amounts of doubly refractile lipid between capillary loops of glomeruli. The material is extra-cellular in position and resembles amyloid in this respect. However, the material fails to stain characteristically with any of the special stains for amyloid. In glomeruli which are only moderately involved many of the loops remain patent (Fig. 2), but with increased deposition the loops become closed and the lining cells of the capillaries enmeshed in the extra-cellular deposit. In addition, there is also deposited in Bowman's capsule a similar substance which is more fatty in character, but this, too, is extra-cellular in position (Fig. 1).

Nothing is seen to suggest inflammation. In addition to the absence of inflammatory exudate there is no evidence of proliferation of the endothelial cells of the glomerular capillaries, nor are changes in basement membranes present such as have been described in the intercapillary glomerulonephritis of Fahr[5] or in the extra-capillary forms of glomerulonephritis, as described by McGregor.[6]

Occasionally "pseudo" crescentic adhesions are encountered, but these are due not to inflammation but to the deposit of a richly fatty substance under the epithelium of Bowman's capsule which pushes into the capsular space and appears to fuse with the extra-cellular deposits in the glomeruli (Fig. 3). This change is frequently seen in the most extensively involved glomeruli.

All sections of kidneys show a moderately severe degree of arteriolar change, but this lesion differs from that usually seen in the ordinary variety of arteriolar sclerosis in the following respects. The media of the affected arterioles contain a hyaline substance which has the same staining qualities as that seen in the intercapillary parts of the glomerulus, and in addition shows vacuoles which stain like the lipids in the intercapillary masses and are doubly refractile (Fig. 4). In occasional glomeruli cut to show the entry of the afferent arteriole into the capillary network the deposition of intercapillary material appears to be continuous with the lipo-hyalin in the media of the afferent arterioles. The medium-sized arteries are not involved.

The tubular changes in the kidneys show moderately severe cloudy swelling with focal desquamation of cytoplasm. Sections stained for fat show small amounts of doubly refractile fat in the proximal convoluted tubules. This change is quite focal in character but is by no means severe or widespread. Both grossly and microscopically, the kidneys fail to show changes consistent with a diagnosis of nephrosis.

Kimmelstiel and Wilson also regarded the above described changes as degenerative in nature but believe that it represents hyalinization of the intercapillary connective tissue. The fact that this lipo-hyalin is extra-cellular in location in the glomerulus, and is also found in the arterioles of the kidneys and occasionally in the arterioles of the pancreas, suggests that it may be in the nature of a deposit much like amyloid. The chemical composition of this particular type of lipo-hyalin remains for the present undetermined. The term "intercapillary glomerulosclerosis" which Kimmelstiel and Wilson gave to this condition should be applied until the exact chemical nature of this degeneration product is determined.

Clinically, the outstanding features of this disease picture are the œdema which is subcutaneous and generalized, the hypertension and the marked albuminuria. The amount and distribution of the œdema, particularly to the arms and face, is not due to heart failure and may be the presenting symptom. In neither of the cases reported above was there marked passive congestion of viscera, nor was the heart the seat of severe disease or excessive hypertrophy.

The blood chemistry findings (Table I) show a reduction in total blood proteins, a marked

hypoalbuminæmia, and a lowering but not a complete reversal of the albumin-globulin ratio. These, together with the massive albuminuria, are characteristic of the nephrotic syndrome. There is no lipæmia, and in this respect the picture differs from the usual lipid nephrosis. The cholesterol level in case 1 was only moderately elevated. Basal metabolic rates were not obtained in either of the patients. Hypertension and impairment of renal function accompany this syndrome in diabetes of long standing. Fishberg[7] mentions the nephrotic syndrome as occurring exceptionally in diabetes, but does not indicate the nature of the renal pathological changes, other than to state that arterial and arteriolar changes were present in such kidneys.

TABLE I.

Findings	*Case 1, aged 67*	*Case 2, aged 65*
Œdema of nephrotic type	Marked	Extreme
Hypertension	From 235/110 to 160/70 mm. Hg.	174/110 mm. Hg.
Albuminuria	2+ to 3+	4+
Diabetes	10 years' duration	15 years' duration
Renal impairment	Non-protein nitrogen from 95 to 151 mg. per cent. Urea clearance 18.9 per cent of normal.	Non-protein nitrogen 72.0 mg. per cent
Hypoalbuminæmia	Total protein 4.7 g. Albumin 2.98 g.	Total protein 5.5 g. Albumin 2.9 g.
Albumin-globulin ratio	1.7 to 1	1.2 to 1
Hyposthenuria	Fixation of specific gravity 1.012 to 1.013	Varied from 1.010 to 1.020
Anæmia	3,120,000 red blood cells; 4,700 white blood cells; hæmoglobin (Sahli) 65 per cent.	3,200,000 red blood cells; hæmoglobin (Sahli) 70 per cent; 16,000 white blood cells (terminal bronchopneumonia)
Heart failure	Questionable	Electrocardiographic evidence only of myocardial disease.
Retinal changes	Old and recent hæmorrhages	Not visualized

That we are not here dealing with the nephrotic phase of chronic glomerulonephritis is indicated by case 1 in which the first admission revealed no impairment of renal function. Further, the histories of these and other reported cases give no indication of previous renal disease. The nephrotic phase of chronic glomerulonephritis occurs in the younger age-groups, and these cases together with others from the literature are, with one exception,* all 40 years of age and above. Finally, the histological changes in the kidneys, as seen at autopsy, exclude glomerulonephritis for, as Derow *et al.*[4] have demonstrated, autopsied cases in which the nephrotic phase of chronic glomerulonephritis and diabetes mellitus co-existed, showed only the glomerular lesions of chronic glomerulonephritis and not those of the type described above.

Renal amyloidosis[8] and the acute necrotizing nephroses have been excluded. No thrombosis of the renal veins[9] was present in these cases which might account for the nephrotic syndrome.

Hypertension and impaired renal concentrating power do not usually accompany nephrosis,[10] but appear to be associated with the nephrotic syndrome in the diabetic patient. The frequent association of hypertension with diabetes in older age-groups[11, 12] is well established. The marked degree of arteriolar disease present in the above reported cases accounts for the hypertension. The impaired renal function is a late manifestation of this disease picture and is dependent upon both the glomerular and arteriolar lesions.

The frequency of the disease entity described above cannot at the present time be determined. However, it would appear from the work of Kimmelstiel and Wilson[1] and Anson[2] that this disease picture is rather uncommon. Twenty-one cases (including the two here recorded), have been reported. In 400 consecutive necropsies in this hospital 14 cases in which the clinical diagnosis of diabetes with hypertension were made were reviewed. Of these only two cases were found which fulfill both the clinical and histological criteria mentioned above. The disease picture occurs in a relatively old age group, from the fourth to the seventh decade (with one exception), the majority being in the sixth and seventh decades.

SUMMARY AND CONCLUSIONS

1. In older patients with diabetes of long standing a nephrotic syndrome (massive œdema of nephrotic distribution, hypoproteinæmia, hypoalbuminæmia, lowering of the albumin-globulin ratio and massive albuminuria) may supervene, which is accompanied by hypertension and a variable degree of renal failure.

2. The kidneys of such persons show a char-

* One patient in Anson's series was 35.

acteristic and distinctive glomerular and arteriolar degenerative change which indicates that we are dealing with a distinct clinico-pathological entity.

3. Two cases which fulfill the clinical and pathological criteria of this disease entity have been reported.

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A CONTRIBUTION TO THE ANATOMY OF THE ULNAR BURSA*

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SINCE Kanavel first established a sound scientific basis for the surgery of the tendon sheaths of the hand much has been written about the anatomy of the sheaths, and every writer has made special reference to the continuity between the ulnar bursa and the sheath of the fifth digit. So far as I am aware, however, no one has presented any definite evidence regarding the exact nature of this continuity. Some standard illustrations show an intervening constriction and many writers specifically mention it, but most books and articles show a simple wide-open communication.

The writer became particularly interested in this region for two reasons. All writers appear to agree that Kanavel's sign is a reliable aid in the diagnosis of ulnar bursitis, but no adequate explanation of its production has been offered. Nor, indeed, on the accepted anatomical descriptions, did any explanation seem available. My second reason was the clinical observation that infections of the digital sheath of the little finger fail to spread to the ulnar bursa in a number of cases that is too great to be consistent with the usual anatomical statistics.

In an attempt to discover the exact structure of this region, I have carefully investigated the hands dissected in our anatomy laboratory during the past four years. Many had been opened by students before I could complete my study and these have not been included. A few of the tabulated cases are from descriptions furnished by Prof. D. C. Matheson but most have been investigated personally.

Contrary to the usual custom, I shall present the conclusions of our study before giving the tabulated results. Otherwise, the reader might have difficulty in interpreting some of the descriptive terms used.

The arrangement of the common flexor sheath (ulnar bursa) at the wrist, as shown in Fig. 1, is well known and requires no description. A short distance distal to the flexor retinaculum (transverse carpal ligament, anterior annular ligament), the tendons to the index finger move laterally away from the sheath, which becomes slightly narrowed (Fig. 2). A variable, but short, distance more distally, the middle finger tendons move away and the sheath becomes still more narrowed (Fig. 3). A similar change about the tendons to the ring finger produces the arrangement shown in Fig. 4. These changes are very constant but the more distal part of the sheath is quite variable.

Most commonly, the superficial compartment retracts first, as in Fig. 5, leaving a small crescentic section that partially envelops the profundus tendon from its medial side. This form may persist, but, equally frequently, there is a retraction of the deeper part so that only that portion between the tendons remains (Fig. 6). We have found that the communication between the ulnar bursa and the digital sheath of the little finger usually takes one of two forms:

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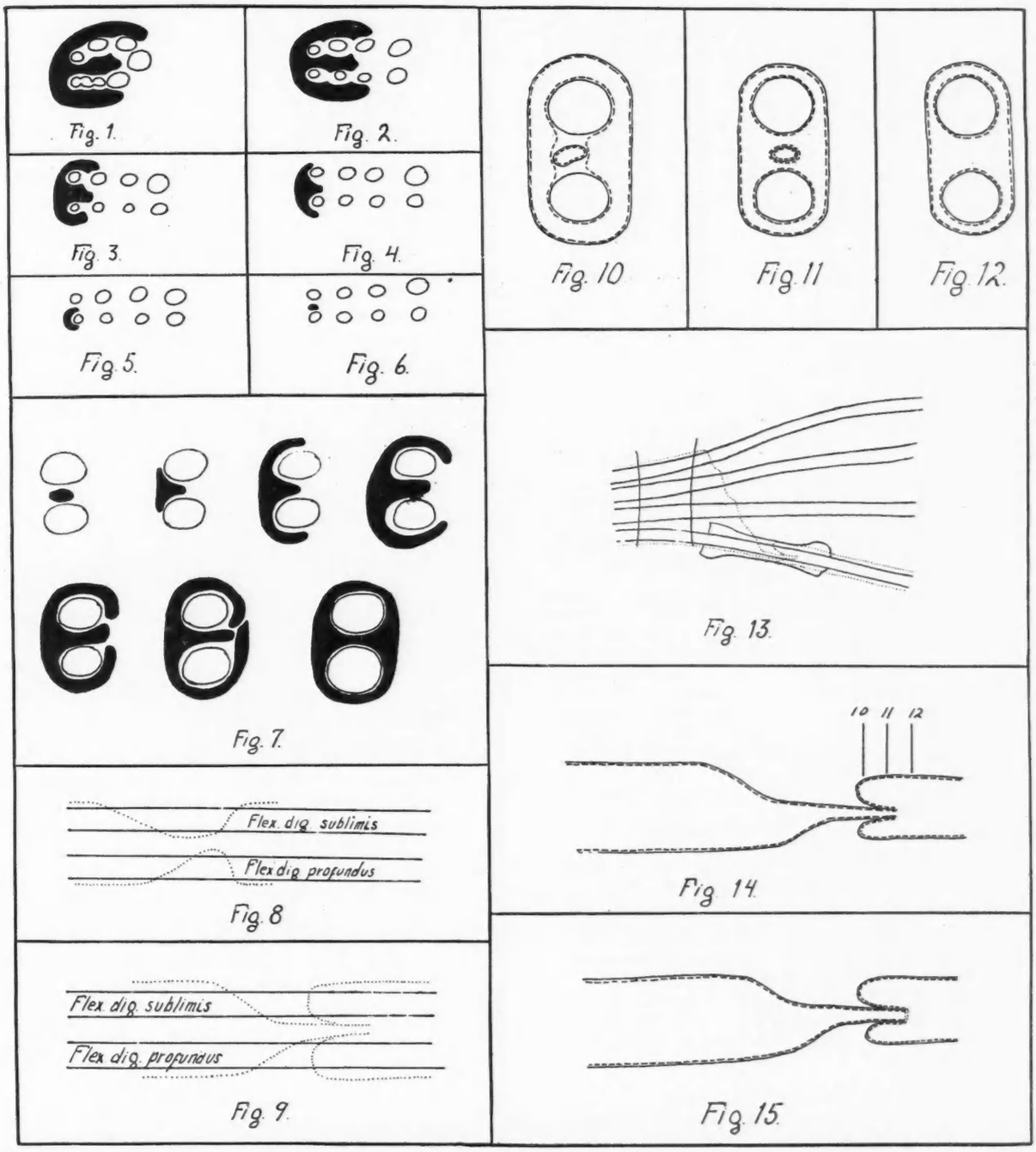
(1) a strictly tubular communication between the sublimis and profundus tendon, or (2) an extension of the bursa to a variable extent about the medial and, possibly, the deep surface of the profundus tendon. It is quite unusual to find a communication that does not include the portion between the tendons.

It is easy to imagine a reversal of the above described retraction, leading to extension, through the stages shown in Fig. 7, into the complete tubular sheath characteristic of the digits. When this occurs, as it occasionally does, the transition is rapid, as indicated by the diagrammatic medial view in Fig. 8. But we have found that simple continuity is comparatively rare.

Fig. 9 is a medial view showing the more common arrangement. The ulnar bursa tapers out into a funnel, the small distal end continuing, either between the tendons or partially wrapped about the medial part of the profundus. This tapering end is invaginated into the proximal end of the much broader digital sheath. This invagination is often more than 1 cm. and may be as much as 3 cm.

Figs. 10, 11 and 12 show these changes in



cross section. Compare with Fig. 14, in which the level of the sections is indicated. In these three, as in Figs. 14 and 15, the smooth synovial surface is shown by interrupted lines. In Fig. 10 one may see the digital sheath lined by synovia, reflected to the tendons which it covers except on their opposed surfaces. The tapered end of the ulnar bursa lies between the tendons, its synovial surface internally. The visceral layer of the digital sheath, which is continuous with the parietal layer immediately proximal to this level, passes from the sublimis to the profundus tendon, on both medial and lateral sides, a minimum amount of loose areolar tissue intervening. Between the levels shown in Figs. 10 and 11 the visceral synovia of the digital sheath has met and broken through between the continuing ulnar bursa and the tendons. As a result, each tendon is entirely surrounded by synovia and the funnel-shaped end of the ulnar bursa now has a synovial covering on both surfaces. The ulnar bursa ends before the level of Fig. 12 is reached, and the arrangement is that which is characteristic of the digital sheaths. Fig. 13 shows a palmar view, the outline of the sheaths being indicated by dotted lines. Fig. 14 is a diagrammatic medial view of the arrangement fully described above. The tendons have been omitted for convenience. Compare with Fig. 9. In Fig. 15, a thin membrane, with synovia on both surfaces, closes the mouth of the tapered end of the ulnar bursa. This is quite common and is referred to in the Table as "contact, no communication".

Investigation of 46 hands revealed 7 types, of which only three appear to be common.

TABLE I.

Type 1.	Invagination and communication between profundus and sublimis tendons	12
Type 2.	Invagination with communication between tendons and also partially about profundus tendon	12
Type 3.	Invagination, contact but no communication	12
Type 4.	Direct continuity:	
	(*a*) Between tendons	2
	(*b*) Between tendons and medial to profundus	2
	(*c*) Deep to profundus	1
	(*d*) Between tendons and medial to both as in Fig. 4	1
Type 5.	Ulnar bursa does not reach digital sheath	2
Type 6.	As in type 2, but sublimis had separate sheath, closed distally. Sheath about profundus invaginated and in communication	1
Type 7.	Ulnar bursa converted into complete sheath about profundus tendon. This invaginated and communicated with digital sheath	1

Undoubtedly there are other rare types not encountered in this series.

DISCUSSION

From the above detailed tabulation, two important general facts become apparent.

1. In 25 per cent of hands there is no normal communication between the ulnar bursa and the digital sheath of the little finger.

2. In more than 50 per cent of hands the communication is small and valve-like. Both of these generalities merit further consideration.

In the majority of hands showing no normal communication the two synovial sacs are separated only by a thin septum. This could be easily ruptured by the pressure of an injected mass, and it is easy to understand why, after investigations by injection, the figures for communication should be too high. Similarly, infection of the ulnar bursa is likely to reach the digital sheath by rupture of this membrane. It does not follow, however, that infections of the digital sheath can be easily spread to the ulnar bursa. The valve-like arrangement of the pointed and invaginated distal end of the ulnar bursa may readily close the opening, when one is present, and must relieve the septum of much of the pressure to which it would otherwise be subjected.

It is suggested that the production of Kanavel's sign is related to the peculiar anatomical structure of this region. Its exact mechanism probably varies, being tension in some cases and friction in others. The findings presented above appear adequate to support either hypothesis.

A study of the development of these sheaths is planned. It appears probable that they develop separately and, if so, the time of contact and breaking through might be of clinical significance.

SUMMARY

The exact details of the relation between the ulnar bursa and the digital sheath of the little finger have been investigated and reported.

The findings have been discussed as a possible basis for the production of Kanavel's sign of ulnar bursitis and in relation to the spread of infection.

I wish to express my gratitude to Prof. D. C. Matheson, who first observed some of the features described above, for his interest and assistance in much of this investigation.

CYST OF THE CAVUM VERGÆ

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THE following case is reported as an instance of some of the etiological and diagnostic pitfalls that occur in neuropsychiatry. Tumours, cysts, etc., form a surprisingly large proportion of those cases in which a diagnosis of functional nervous disorder has been based on a complaint of chronic or recurrent headache. This is especially liable to occur when one is too ready to accept a history of minor trauma as an important factor in the production of crippling headache. In the present case no attempt will be made to give a full account of the anatomy of the anomalies encountered in the sub-callosal region. Recently Thompson[1] has published a valuable and complete report, Wolf and Bamford[2] have studied the histology, Dandy[3] and Van Wagenen and Aird[4] have reported cases in which operation has been performed. The currently accepted theory as to the embryology is that advanced by Corning.[5]

CASE REPORT*

Capt. I.G.M., born in 1896; racial origin English. He reported in January, 1930, complaining of increasing periodic headache so severe that he was no longer able to work. He is said to have suffered thus since being struck on the side of the head by a rifle butt in 1918.

The case was not very carefully investigated at first, and, based largely on a history of early domestic difficulties, a diagnosis of neurasthenia was made and accepted as service-related because of an entry on discharge board (1919) which read, "Some insomnia and tremor of the hands".

The family history is unimpeachable (carefully confirmed). Gestation and delivery were normal and he was considered a healthy, rugged boy. At school he made average progress and excelled in athletics. During adolescence he suffered from occasional "sick headaches" which lasted 24 hours and were terminated by vomiting.

Early in the Great War he joined the Canadian Expeditionary Force. His official medical sheets for the war bear the following entries: (1) slight shrapnel wound shoulder; (2) bronchial trouble; (3) tonsillectomy; (4) gonorrhœa; (5) some insomnia and tremor of the hands. During the war there was a brief and unfortunate marital interlude, ending in divorce. This assumed great significance in the minds of some examiners. It seems to have had almost as much bearing as the unconfirmed history of head injury.

The episode which may be said to constitute the beginning of the present illness occurred in 1922. At that time he was playing goal for a professional hockey team, but was obviously "slipping" and was about to be replaced. The staff of the Hamilton General Hospital has kindly supplied us with the history of this illness. He complained of severe, splitting headaches, occurring mostly at night and lasting fifteen minutes at a time. The spinal fluid was under greatly increased pressure. There was bilateral choking of the optic discs. Serological examinations were negative. Ten days after admission, numbness of the right side developed and a left sub-temporal decompression was done. He improved rapidly and two weeks later was discharged from the hospital.

For the next eight years he worked steadily at his trade as tailor, and bouts of headache were occasional and brief. There was during this period a gradual but definite personality change. He became irritable, irresponsible, and subject to uncontrollable outbursts of temper. He was happily remarried and three healthy children were born.

As mentioned previously, he sought medical advice in 1930, and a diagnosis of neurasthenia was made and accepted as due to the strain of war service. There were distressing personal factors which to some extent justified this. By 1932 his demands for some relief from his suffering had become so persistent that it was thought wise to resurvey the whole situation and he was sent to the Neurological Clinic of the Department of Pensions and National Health in Toronto. He was there very thoroughly examined by a number of individuals, including an experienced neuro-surgeon. Again the final conclusion was that the condition was predominantly functional, but, largely due to the insistence of one examiner, an organic substrate was suggested and a tentative diagnosis of chronic arachnoiditis brought forward. The records of this admission contain a number of significant observations and notes which were difficult to interpret then but become quite understandable in the light of later developments. Briefly, these were: (1) at times, when in the sitting position, there were irregular clonic contractions (spontaneous) of both quadriceps muscles, and on several occasions what was thought to be quadriceps clonus was elicited; (2) constant, generalized increase in muscle tone accompanied by unusually brisk tendon jerks; (3) when headache was severe there was marked bulging of the hiatus cranialis; (4) no air entered the ventricle following spinal subarachnoid injection; the intergyral fissures were jointly shown and though rather faint were symmetrical; (5) the fundi, fields of vision and labyrinthic reactions were all carefully checked and no abnormality detected.

After his return to Winnipeg he came under the personal supervision of the author and has remained so since. Between May, 1932, and February, 1934, there were eight hospital admissions. On each occasion the complaint was unbearable headache which was promptly relieved by the removal of 20 c.c. of spinal fluid or by the intravenous injection of 50 c.c. of 30 per cent glucose. It was puzzling that, although there was always bulging of the hiatus, on no occasion did the manometric reading in the horizontal position exceed 170 mm. of water. Magnesium sulphate by mouth or by rectum did not give relief.

In February, 1934, there was a new and highly significant development. He was admitted in coma, with the history of having had "seizures" for which three grains of nembutal had been given by his family

* The history recorded was obtained piecemeal from records, friends and relatives, and is much condensed.

physician. He remained stuporous for twelve hours, and then appeared to be his usual self, but had no recollection of the seizures nor of how he got to the hospital. At that time it was repeatedly observed that the tendon and periosteal reflexes of the left arm were much more active than the right. He was kept in hospital without medication and under strict twenty-four hour supervision for three months, but no seizures or periods of confusion were noted.

Over the next three years there were no further convulsive episodes. The family reported a progressive loss of interest in his appearance and surroundings and an increasing irritability. Being as far from a satisfactory explanation of the situation as at the start, and feeling that because of too great familiarity with the whole situation a new opinion should be sought, another neurologist was asked to see him in January, 1937. The finding recorded were essentially the same as our own, but the diagnosis suggested was "traumatic encephalopathy".

On June 25, 1937, he was again admitted, with the history of a "seizure" at home. He was very drowsy but could be roused and seemed to recognize familiar faces. Speech was thick and unintelligible. On this occasion the decompression did not bulge. The following day he was still drowsy and he vomited and was incontinent. The optic discs were normal. The spinal pressure was 160 mm. of water in the horizontal position on June 29th. On June 30th he was clear mentally and was up and about the ward. There was partial amnesia for the seizure and subsequent events. For a few days he seemed quite well, but on July 20th began to complain of intense headache which awakened him about 4.30 a.m. daily. On the evening of July 27th he was confused, wandered aimlessly about the ward, and voided on the floor in the presence of visitors. He denied any recollection of this.

Encephalography with the patient in the sitting position was again carried out on July 30, 1937. It was accomplished without untoward reaction. Only 90 c.c. of fluid could be removed, the cessation of flow being quite abrupt; 105 c.c. of air were injected. The roentgenological findings were essentially the same as in 1932. No air entered the ventricles, and the cortical markings were perhaps less distinct. There was evidence of absorption of the posterior clinoid processes. The fact that no air had passed to the ventricles on either occasion, and that air did outline the intergyral fissures over the hemispheres each time without showing significant abnormality ruled out arachnitis. That increased intracranial pressure was present was proved by the erosion of the clinoids. After reviewing the whole situation, it was therefore concluded that the apparent deterioration of cortical function, which had progressed so slowly, must be due to an internal hydrocephalus resulting from an intermittent obstruction in the region of the third ventricle.

He was transferred to the Montreal Neurological Institute on October 11, 1937, and the following notes and reports are available through the kindness of Dr. William Cone.

The physical findings were essentially the same as those previously recorded, with additional observation of slight dysmetria of the left arm. He was pathetically insistent that something be done to prove something was really wrong.

Oxygen was injected directly into the ventricles on October 19, 1937. Dr. A. E. Childe reported as follows: "Both lateral ventricles are enormously and symmetrically dilated. There is a rounded filling defect, 3 cm. in diameter in the third ventricle; this arises from its superior portion and extends forward so that it obstructs most of the foramen of Monro; it extends posteriorly to within 1 cm. of the pineal. The anterior portion of the third ventricle below this filling defect is greatly dilated and extends downward and forward almost into the sella. The posterior portion of the third ventricle is partially visualized but apparently not dilated. The aqueduct and fourth ventricle are not visible. *Impression*: There is an expanding lesion in the superior portion of the third ventricle."

The filling defect in the third ventricle is well shown in Fig. 1.

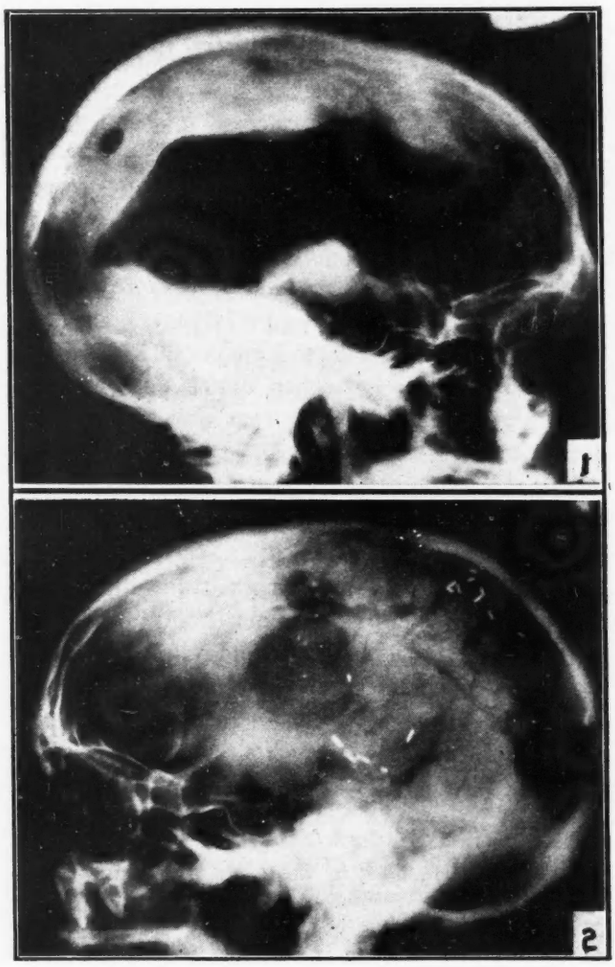

Fig. 1.—Lateral film of the skull after the injection of oxygen into the lateral ventricle. The cyst of the cavum vergæ produces a filling defect in the superior and posterior portion of the third ventricle, and as a result of the obstruction caused by the cyst there has been an enormous dilatation of the anterior part of the third ventricle and the lateral ventricles. **Fig. 2.**—Note deformity of third ventricle as in Fig. 1.

The following day operation was carried out and the operation note was as follows:

"The corpus callosum was very thin, soft and yellowish in colour. As it was separated, using a blunt dissector, a large amount of fluid escaped. The fluid was clear. As the dissection was deepened the veins of Galen were seen to be widely separated and a thin membrane resembling omentum with delicate vessels was encountered. This seemed to be a cyst wall; it was so delicate that it could not be removed, nor did I see any reason for removing it. The fluid in the cyst was clear. Since I had never encountered a similar situation before, I was willing to accept this as the complete explanation and carried the exploration much farther forward toward the foramen of Monro, into the anterior part of the third ventricle, through defects in the septum pellucidum. Nothing else was encountered to explain the block in the posterior-superior part of the third ventricle. Two specimens were taken, one from the delicate membrane forming what seemed to be the cyst wall and one

piece from the softened corpus callosum. Dandy described cysts in the cavum vergæ and septum pellucidum which are similar to the one encountered in this patient. Here the cavum vergæ was involved.

"Under avertin and ether anæsthesia a scalp flap was reflected. A bone flap was then elevated which was completely detached from the scalp flap. The dura was reflected to the median longitudinal sinus; veins entering the median longitudinal sinus from the hemisphere were doubly ligated and cut, and after ventricular puncture had reduced the pressure the right hemisphere was retracted, to expose the corpus callosum. The corpus callosum was broken through with blunt dissection. Biopsy specimens were taken from it and from the cyst wall. A rubber drain was placed down to the third ventricle and carried out through a separate stab wound. The dura was tightly closed. The bone flap was tied in place and the scalp was sutured in two layers in the usual way."

The immediate post-operative course was satisfactory. Immediately after operation there was some weakness in the left arm and leg, and some uncertainty of movement of the left arm. There was also a partial left homonymous hemianopsia. Twelve days after operation a small amount of oxygen was injected into the spinal subarachnoid space and x-ray films showed that it now had entered the lateral ventricles. The third ventricle contained gas and there was still evidence of a filling defect, due, it was felt, to the cyst wall which had been left in place. He was discharged from the hospital on November 13, 1937, twenty-three days after operation.

During the past two years he has been seen at intervals of a few weeks, and it is noteworthy that there has been a steady improvement in the neurological picture. The hemianopsia cleared up entirely within three months. For about a year he had difficulty getting around because his "left leg would go out from under him", and on this account he used a cane, but for the past six months has been going down town unaccompanied and has discarded the walking stick.

The most recent examination (February 12, 1940) reveals only slight residua. Until two or three months ago he walked and stood with the trunk tilted to the right at an angle of 15° from the vertical. This position was not fixed and is no longer present. The left arm jerks are still exaggerated, otherwise the deep and superficial reflexes are all within normal limits. There is no dysmetria. The optic discs show signs of slight secondary atrophy. There has been no headache since operation, and, in spite of the fact that the corpus callosum was partially divided, no evidence of any form of apraxia.

Unfortunately, intellectual and psychic improvement has not kept pace with the purely physical. Remote memory is excellent, but immediate recall is poor and he suffers attacks of what he calls "absent-mindedness", *i.e.*, may be temporarily unable to remember where he is going. He is, however, always correctly oriented in his immediate surroundings. Seemingly, he is unable to formulate new ideas, and, although conversant with recent events in world affairs, attaches to them very little significance. So far as his daily life is concerned judgment is fairly good, and he makes no serious social gaffes, but his sense of humour is childish and he is inordinately amused by things which scarcely seem funny to the average adult. There is a definite tendency to stereotypy but no true perseveration. He is mildly euphoric. There has been no definite speech defect, but in ordinary conversation his vocabulary appears to be much reduced and he uses very simple forms of expression. However, using test vocabularies, he rates well up on the 15-16 year level. There has been no motor restlessness, and no convulsive manifestations have been reported.

Although no signs of chronic or intermittent increase in intracranial pressure have been present since operation, it was thought wise to ascertain the intracranial status as accurately as possible, and lumbar insufflation was carried out in February, 1940. Dr. Childe reported on the films as follows:

"It would appear that whilst a complete block is not present it is difficult for oxygen to reach the lateral ventricles from below at the present time, although it gets into the 3rd ventricle; this filling defect in the 3rd ventricle corresponds almost exactly to the filling defect seen before operation in size and position as well as shape. There is a possibility that its upper posterior border does not extend quite so far backward now as it did previously but it evidently extends downward as close to the sella turcica as it did before. The filling defect seen immediately after operation was somewhat smaller and did not extend downward as far toward the sella turcica as the defect noted in the other two examinations. I suppose the most logical suggestion is that in some manner the cyst found at operation has reformed."

In the face of the excellent clinical result this was rather a disappointment. Just what route the fluid is following remains a matter of conjecture, but that functional interventricular circulation is present seems a certainty. Plates taken after twenty-four hours show considerable air trapped in the ventricles.

COMMENT

Cyst of the cavum vergæ causing definite symptoms is a rare entity. In fact Dandy expressed the view that it never occurred except in association with cyst of the septum pellucidum. No such combination was present in this case, though there were large defects in the septum, and it is conceivable that a spontaneous decompression had occurred. The persistence of the deformity, as shown by air injection, two years after operation, suggests that a more radical method might be used to advantage. Unlike cysts of the septum, the walls of which are free in the ventricular cavities and when perforated will be collapsed by pressure of ventricular fluid, it seems likely that the walls of a cyst of the cavum become more or less incorporated with the surrounding solid structures and thus cause a fixed deformity. There is nothing in the clinical or roentgenological picture which is pathognomonic, and at present the diagnosis can only be made with certainty at operation. A very long intermission of symptoms may be suggestive; one of Dandy's cases had a free period of ten years; ours, one of eight. (There was no surgical interference in Dandy's case). Our patient's early adult social level was above the average, and with earlier diagnosis it seems certain a perfect result would have been obtained.

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ACCIDENTAL BILATERAL LIGATION OF THE URETERS

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A CASE in which both ureters were accidentally obstructed completely during the course of a pelvic operation is particularly interesting because the urinary tract was entirely normal ten months later, as demonstrated by thorough urological examination.

CASE REPORT

Mrs. O.A.M., aged 34 years, came to the Calgary Associate Clinic on March 8, 1938, complaining of menorrhagia and metrorrhagia during the previous three years. The remainder of the history was irrelevant. The patient appeared rather pale; otherwise the general physical examination was essentially negative except for the pelvic findings. There was a low midline scar from a previous pelvic operation. The cervix was badly lacerated. The uterus was freely movable and about normal size on bimanual examination. There were no pelvic masses. The hæmoglobin was 55 per cent (Sahli) and the red blood cells 3,850,000 per cubic mm. The urine was normal, chemically and microscopically.

Iron therapy was instituted and in two months the hæmoglobin and red cell count were normal. There had been one rather sharp hæmorrhage for one day and intermittent spotting. Because of the persistent bleeding and lacerated cervix the patient was advised to have a total abdominal hysterectomy.

The operation was performed on June 4, 1938, under cyclopropane and ether anæsthesia. The pelvic organs were exposed through a low midline incision. The right ovary was not present, having been removed at the previous operation. Total hysterectomy was performed and the tubes removed with the uterus. The left ovary was retained.

The patient's immediate post-operative condition was good. Fluids were taken by mouth and given intravenously. During the night she voided three ounces and later catheterization showed the bladder empty. On the following day she felt reasonably well and had the average post-operative rise in fever and increased pulse. During the second twenty-four hours 98 ounces of fluids were taken by mouth and vein, yet repeated catheterization showed the bladder empty. The blood non-protein nitrogen was 64 mg. per 100 c.c. Cystoscopy was performed. Catheters were passed up both ureters about 4 or 5 inches and there met impassable obstructions. On the following day the blood non-protein nitrogen was 80 mg. per 100 c.c. Anuria persisted. The patient was somewhat listless, drowsy, and complained of headache. A second cystoscopy showed ureteral obstruction as before. It was then decided to drain the kidneys.

Under cyclopropane anæsthesia the right kidney was exposed through the usual oblique flank incision. The kidney was dusky and tensely swollen. The pelvis was dilated and tense. The ureter was dilated to about 1 cm. in diameter. An incision was made in the ureter just below the ureteropelvic junction and an ordinary catheter passed up into the pelvis and fixed there. The wound was closed in layers with drainage. The patient withstood the operation well. During the following twenty-four hours she received 137 ounces of fluids by mouth and vein, and 224 ounces of urine drained from the catheter in the kidney. The bladder remained empty. The blood non-protein nitrogen dropped to 44 mg. per 100 c.c. and her general condition was somewhat better. The Table illustrates the fluid intake and output.

On June 11, 1938, seven days after hysterectomy, the left kidney was exposed through the usual flank incision. It was found tensely swollen and discoloured, with dilatation of the ureter and pelvis. Nephrostomy was performed according to the technique of Cabot. The Table shows that polyuria following drainage of the left kidney was less than that following drainage of the right. Within three days the output of the two kidneys was about the same and remained so thereafter.

Cystoscopy was performed on July 5, 1938, thirty-one days after the hysterectomy. A catheter (No. 7 F.) was passed easily up the left ureter to the pelvis, but on the right obstruction was met about 6 inches from the bladder. Since the left ureter was patent, the nephrostomy tube was removed. There was no leakage of urine and the wound healed promptly. On July 12, 1938, the catheter in the right kidney slipped out accidentally. There was no leakage of urine, no pain, and no fever. The wound closed promptly. The patient was dismissed from the hospital on July 16th.

TABLE I.

SHOWING FLUID INTAKE AND OUTPUT FOLLOWING OPERATIONS

Date		*Blood non-protein nitrogen*	*Fluid intake c.c.*	*Fluid output c.c.*	
				Right	*Left*
6/4/38	Hysterectomy		4,350	0	0
6/5/38			2,950	0	0
6/6/38	Cystoscopy	64	4,700	0	0
6/7/38	Cystoscopy Right ureterostomy	80	4,125	6,820	0
6/8/38		44	4,750	7,570	0
6/9/38			4,875	5,700	0
6/10/38			4,650	3,900	0
6/11/38	Left nephrostomy		4,050	2,470	600
6/12/38			4,450	2,220	1,080
6/13/38			2,350	390	360

She was seen at the office on August 26, 1938. She felt well and the urine was free from pus and blood. On April 13, 1939, about ten months after the operation, the urine was still free from pus, blood, and bacteria. An intravenous urogram showed prompt appearance of dye in both kidneys, indicating good function, and the pelves, calyces and ureters were entirely normal. The patient felt perfectly well in every way.

Injuries to the ureter during the course of pelvic operations are probably much more common than the reported cases would suggest. Although the literature contains several exhaustive reviews[1] of the subject it is probable that most of the cases have not been reported. Because of the silent development of hydronephrotic atrophy following the ligature of a single

ureter, many cases have not been recognized. Ureteral injuries are estimated to occur in from 0.5 to 3 per cent of all operations on the female genital organs. Unilateral injury occurs six times as frequently as bilateral injury. The most common result of ureteral injury is ureteral fistula, either abdominal or vaginal. The accident has most commonly followed total abdominal hysterectomy, especially when done for cancer or large cervical and intraligamentous fibroids. Vaginal hysterectomy is the operation which comes second in frequency as a procedure complicated by ureteral injuries.

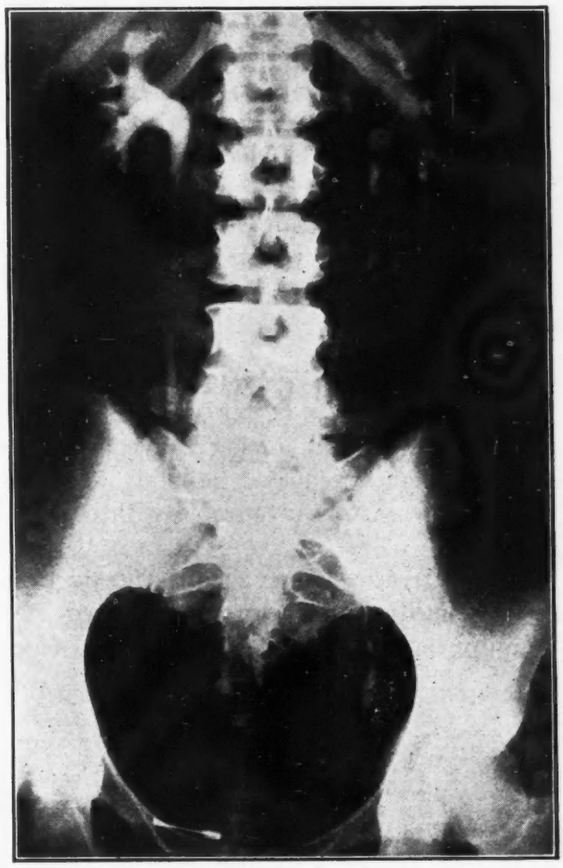

Fig. 1.—Intravenous urogram made ten months after operation for accidental bilateral ligation of the ureter.

Bilateral ligation occurs in more than half of the reported cases of bilateral injury. The remaining cases are chiefly bilateral uterovaginal fistulæ which appear at any time up to ten or twelve days following operation. These are due to various types of injury at the time of the operation, such as clamping, cutting, stripping, ligating, etc.

The outstanding symptom of bilateral ureteral ligation is anuria. The patient may void urine which was present in the bladder prior to the time of operation, but thereafter the bladder is found empty after repeated catheterization. Anuria from ureteral obstruction must be differentiated from anuria due to suppression of urine, which latter may be a result of inadequate fluid intake, shock, nephritis, or other renal disease. Ligation of one ureter and organic disease of the opposite kidney may cause anuria and must be recognized. Anuria might also result from the ligation of one ureter with the so-called reno-renal reflex producing complete suppression of urine in the opposite kidney. It is our opinion, however, that the reno-renal reflex probably does not occur in the presence of a healthy opposite kidney. Anuria from bilateral ligation is generally painless. Uræmic symptoms may appear any time after twenty-four hours. However, uræmic symptoms cannot be considered of diagnostic importance because the ureteral obstruction should have been recognized and relieved long before systemic manifestations of renal insufficiency appear. As soon as anuria is observed following operation a cystoscopic examination should be performed and an attempt made to catheterize both ureters. The demonstration of impassable obstruction requires immediate relief of the obstruction. Intravenous urograms have no place in the study of such cases because the obstructed kidney is not producing urine and therefore cannot excrete the dye.

There are two possible forms of treatment; deligation or nephrostomy. Before discussing the relative merits of the two procedures it may be well to review briefly the effect of ureteral obstruction on the kidneys and the probability of spontaneous relief of obstruction following absorption of sutures. If the sutures have been placed near the ureters or around them in such a way as to produce complete obstruction of the ureters then the patient will die of uræmia before the catgut can possibly be absorbed and the lumen of the ureters restored. Barney,[2] Caulk and Fischer,[3] as well as others, have shown in their experimental work that a catgut ligature placed around the ureter is absorbed in about three weeks and that the ureteral lumen is restored in from six to eight weeks. This occurs with or without nephrostomy. Observations in clinical cases seem to confirm this in the case of human beings as well as in the experiments on dogs. It has been shown repeatedly by various observers in experimental ureteral obstruction that complete ureteral obstruction

for a period of three weeks or more produces marked permanent kidney damage and frequently hydronephrotic atrophy. If the obstruction is relieved before seven to ten days have elapsed then the kidney will return to normal or almost to normal. Therefore, any patient with accidental bilateral ureteral obstruction may be expected to survive and have a normal pair of kidneys if the obstruction is relieved before uræmia begins and before any permanent damage to the kidneys occurs.

There is no agreement among the writers on accidental bilateral ureteral obstruction as to which procedure is better, deligation or nephrostomy. Herman[4] studied 23 reported cases and concluded that deligation was the operation of choice. He stated that "Our advocacy then of deligation is based on the following facts: (*a*) the primary mortality (25 per cent) following deligation is lower than that following nephrostomy (50 per cent); (*b*) the final results are far better with deligation than with nephrostomy (deligation 75 per cent of complete cures; nephrostomy 20 per cent of complete cures)." Feiner,[5] however, reported only one recovery out of six deligations and four ultimate recoveries following five nephrostomies. There are many other reported cases of deligations which were followed by death. Herman considers deligation technically easy. Caulk and others consider it a very difficult and hazardous undertaking. It would seem to us that to open the old wound to find the point where the ureter was damaged would be exceedingly difficult. The nature of the injury might necessitate a plastic procedure which would be almost sure to be unsuccessful in the presence of œdema and trauma from two operations. In such an emergency the patient's condition might not permit time enough for a carefully executed plastic or transplantation operation.

Since we have observed the clinical course of the case reported here and have reviewed carefully a considerable portion of the literature on the subject, it is our opinion that in the majority of cases it would be far safer to perform nephrostomy immediately, and, later, after the patient has recovered from the primary and secondary operations, to deal with the obstructing lesion according to its nature. Nephrostomy might be performed on one side to remove the danger of uræmia and in a few days when the patient's condition is better, drain the other kidney in order to save it from severe permanent damage. If the patient is in good condition immediate bilateral nephrostomy can be done. The technique followed may be that of Cabot[6] or of Rolnick.[7] The former procedure assures one of a more accurately placed and better draining nephrostomy tube with minimum bleeding, whereas the latter might be performed in shorter time by one accustomed to its use.

Following bilateral nephrostomy the ureteral lumen may be restored spontaneously in case of simple ligature or in cases where a suture has been placed near the ureter, producing kinks. If the ureteral lumen is not restored after a reasonable period of time it is probable that a dense scar has followed crushing or other bruising of the ureter. In these cases, when the patient's health is completely restored, the appropriate procedure of end-to-end anastomosis,[8] or implantation into the bladder or rectum may be performed. Cabot[9] has pointed out and emphasized the greater safety of these implantation operations after preliminary nephrostomy rather than performing them as primary procedures.

SUMMARY

A case in which both ureters were accidentally completely obstructed during the course of a pelvic operation is reported in detail. The outcome of the case was favourable with complete cure.

The best treatment for such accidents probably is immediate nephrostomy followed later by appropriate treatment for the obstructing lesion.

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CARCINOMA OF THE VULVA*

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THIS paper is based on a study of 59 patients who have been treated for carcinoma of the vulva in the Gynæcological Department, Toronto General Hospital, and in the Ontario Institute of Radiotherapy, Toronto, since 1929. Fifty-six patients had squamous-celled carcinoma, two had melanotic carcinoma, and one, carcinoma of Bartholin's gland. It is of interest to note that the number of patients in this series is approximately the same as in the series of patients suffering from carcinoma of the body of the uterus treated in these two institutions over a nine year period.[1] In private practice the incidence of carcinoma of the body of the uterus is much greater than that of carcinoma of the vulva which, on the other hand, is more commonly found in older women in poor circumstance, the type often found in the public wards of a large hospital.

Carcinoma of the vulva is a disease of later life. Table I shows the age-incidence. The oldest patient was 79 years, the youngest 41 years, and the average age for the group was 62 years. Sixteen women were nulliparous and 15 had borne three or more children. Sterility or fertility therefore has no association with this type of growth.

TABLE I.

Age.....	40–49	50–59	60–69	70–79
No. of cases...	9*	13*	20	17

*Including a melanotic carcinoma.

Pruritus vulvæ is the most common symptom. In advanced tumours this may be described as pain in the vulva. Many patients were conscious of a lump in the vulva. Sometimes this was described as being painful and tender, but often no discomfort was felt. Some patients had noted ulceration of the vulva, and several reported that the vulva had been swollen. Dysuria and urinary frequency, due to the location of the tumour in the vestibule, or to the urine irritating an ulcerated or tender vulva, were common complaints. Bleeding resulting from friable or ulcerated growths, and discharge from associated infection or necrosis of an advanced tumour, were often profuse enough to attract the patients' attention.

The commonest situation for carcinoma to develop is on the labium majus where it appears as a surface plaque or nodule and soon tends to undergo superficial ulceration and gradually invade and become fixed to the underlying tissues. The labium minus was the next most frequent site, and most of the tumours which appeared to involve the clitoris originated where the labia minora formed the prepuce. Involvement of the vestibule was generally due to spread from adjacent tissue, though two tumours developed here primarily and two on the perineum. The Bartholin gland tumour first showed itself as a hard, nodular swelling of the gland beneath the epithelium.

The more advanced tumours showed extensive destruction of tissue, often with excavating ulceration of the lower vagina. Naturally, with necrosis and infection, the inguinal lymph nodes were frequently palpably enlarged. As a matter of fact, in one-third of the cases where the glands were so noted it was proved microscopically that

TABLE II.

THE SIGNIFICANCE OF PALPABLE LYMPH GLANDS

		Not involved by carcinoma	*Secondary carcinoma*
Surgically removed and examined microscopically.	Living	9	1
	Dead	1*	3
Glands not treated surgically and therefore not observed pathologically.	Living	0	0
	Dead	13	0

*Melanotic carcinoma.

* From the Department of Obstetrics and Gynæcology of the University of Toronto and the Toronto General Hospital, and the Institute of Radiotherapy, Toronto General Hospital.

they were not involved by malignant disease. Table II presents the significance of palpable inguinal glands in this series. The majority of the patients in the group of thirteen where the glands were not removed and therefore not observed had very advanced disease; four of them being almost moribund on admission and only three even moderately hopeful cases.

Twenty-one patients had leukoplakia vulvæ. All these patients suffered from pruritus or pain in the vulva. In only 7 cases had the symptoms existed for less than a year, while in 9 there had been symptoms for five years or more. Taussig[2] says that the proper treatment for leukoplakia vulvæ is vulvectomy, as it is his opinion that one-half of the patients suffering from this condition will develop carcinoma. In the present series, 4 patients who were treated by irradiation for carcinoma which had developed on a pre-existing leukoplakia had later to be subjected to vulvectomy because of the unhealthy condition of the vulvar skin. The vulva showed marked atrophy and the leukoplakia persisted, or the thin tissue-paper-like skin developed areas of chronic ulceration. The course of such a case is well illustrated in Figs. 1, 2 and 3.

The diagnosis of carcinoma of the vulva should not present any difficulty. The symptoms which have been enumerated all indicate an abnormal condition in the vulva and warrant an examination. However, only 25 patients presented themselves within a year of the onset of symptoms. Of these 7 are living; 2 died of melanotic carcinoma, and 3 died from late gland metastases after simple vulvectomy; another met a similar fate after interstitial irradiation and teleradium to the gland areas. The remaining 12 patients were well advanced in years with extensive tumour development, so that in the case of four they merely came into the hospital to die. This type of elderly female is prone through fear, modesty or ignorance to delay seeking advice.

Neglect of symptoms is further emphasized by 27 patients who had symptoms over two years. Sixteen of these complained of pruritus, of whom 9 had well marked leukoplakia. Eight others had known of painless lumps or nodules in the vulva for from two to ten years. Painful ulceration, pain in the vulva, and dysuria were also symptoms which these women suffered for years.

As has been noted, two cases of melanotic carcinoma and a carcinoma of Bartholin's gland are included in this paper. A perusal of the literature[3 to 7] suggests that both these conditions are of sufficient rarity to warrant a short detailed account of the three cases.

CASE 1

Mrs. E.Y., aged 46, para-0. About three months before admission to hospital this patient first noticed a painless discoloured nodule on the inner aspect of the right labium minus. This enlarged rapidly so that by the time she presented herself for treatment

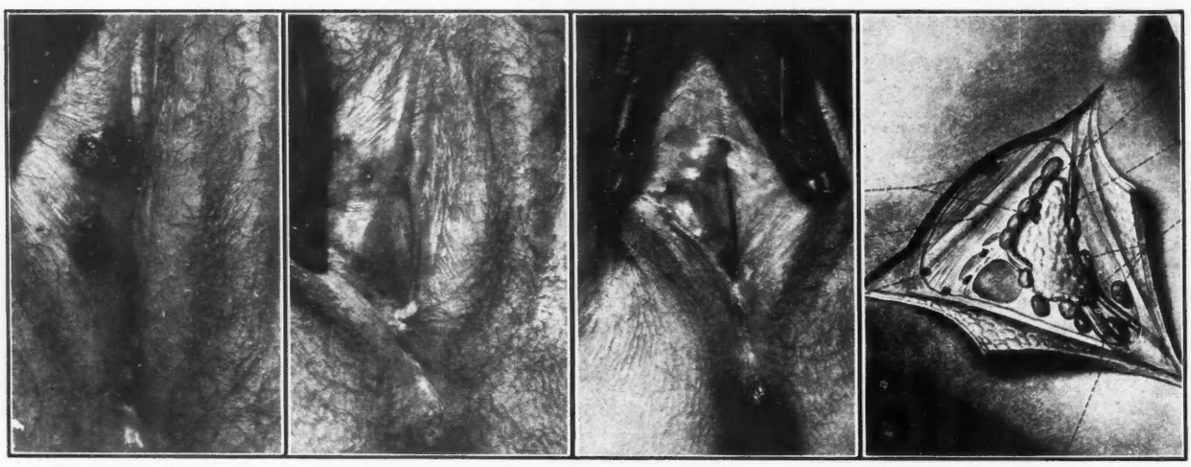

Fig. 1 Fig. 2 Fig. 3 Fig. 4

Fig. 1.—Mrs. A.P. Photograph August 18, 1939. Positive biopsy for squamous-celled carcinoma from both plaque-like areas on inner aspect of right labium majus. **Fig. 2.**—November 13, 1939. After two courses of irradiation contact therapy the tumour areas are healed. **Fig. 3.**—February 9, 1940. The thin atrophic skin shows beginning ulceration. The vulva has atrophied and leukoplakia is evident. Pathological report after vulvectomy was leukoplakia vulvæ with ulceration. **Fig. 4.**—(From Peham and Amreich). The lymphatic drainage of the vulva is shown. The nodes are in two main groups, one parallel and below Poupart's ligament and the other clustered about the entrance of the saphenous vein into the fossa ovalis. The pad of deep fat remaining covers the fossa ovalis and the cribriform fascia.

it was the size of a large acorn. The tumour was purple in colour and appeared to be fastened to underlying tissues by a narrow base. The glands in the inguino-femoral region were slightly enlarged. Radical vulvectomy was performed on September 9, 1938. The block of gland-bearing tissue on the right side showed a pigmented gland, but all glands were discrete, and the pathological report, while confirming clinical diagnosis of melanotic carcinoma of the primary tumour, found the lymph glands free of involvement. She received a course of high voltage irradiation of the vulva and groins with 180 K.V., to deliver 1,800 roentgen units on each groin and 1,200 roentgen units on the vulva and perineum. The reaction was quite severe. She gained in weight and returned to her work, but eleven months after vulvectomy she showed signs of intra-abdominal complication — ascites and nausea and vomiting. The downhill course was rapid, the patient dying a month later with apparently general abdominal carcinomatosis.

CASE 2

Mrs. L.S., aged 53, para-1. About two months before admission this patient began to have slight irregular bleeding from the vagina and a slight, more or less constant discharge. The tumour took the form of a fungating, friable, bluish-red mass about the size of the distal portion of one's thumb, attached to the right superior margin of the urethral orifice. It bled freely when palpated. There was also a smooth, purplish-red, firm and indurated area about 1 inch by one-half inch on the mesial aspect of the left labium minus. There was no enlargement of the inguino-femoral glands. Biopsy gave a diagnosis of melanotic carcinoma.

Roentgen therapy was given over a period of eleven days to develop a dose of 6,240 roentgen units. Six weeks later there was very little change and the inguinal glands were enlarged on both sides. Two months after irradiation treatment the lesions were coagulated by means of bi-polar electrodes. Three months later the vulva was almost free of any suggestion of tumour, but unhealed. The left inguinal glands were massively involved. The course of the patient was steadily downhill. X-ray taken after intravenous thorotrast showed secondary involvement of the liver, and a month later the patient died, seven months after her first admission to hospital.

CASE 3

Mrs. W.A., aged 42, para-0. About three months before consulting her doctor, in April, 1931, this patient began to have slight soreness and burning over the region of Bartholin's gland on the right side. Examination showed a hard, discrete mass involving the gland. This was removed without difficulty and diagnosed basal-celled carcinoma. Patient refused radical operation and was given high voltage treatment post-operatively. Three years later, April, 1934, a small mass developed on the right side of the vulva about the same area. This was treated with 50 mg. radium in contact mould to deliver 200 mg. hours which caused it to disappear by September, 1934. In December, 1934, the inguinal glands on the right side enlarged and the patient's doctor removed them. The pathological diagnosis was secondary basal-celled tumour. Another local recurrence developed in May, 1935, and was treated by interstitial radium; biopsy reported basal-celled tumour. By April, 1936, widely distributed secondary tumours were evident in the lungs, long bones, pelvis and spine. Radium and high voltage therapy did not affect the further progress of disease, and the patient died, January, 1937, with extensive secondary involvement.

The history suggests the hopelessness of anything short of a radical operation, which the patient would not undergo. The long course of the disease was probably responsible for the ultimately widespread secondary involvement.

One tends to associate a low grade of malignancy with carcinoma of the vulva. This present study, however, plainly demonstrates its insidiousness. Local recurrence has appeared years after irradiation treatment has left an unhealthy vulvar skin or when vulvectomy has not removed all the skin area affected by leukoplakia. Gland involvement has developed ten years after vulvectomy and superficial gland excision.

TABLE III.

Cause of death	*Treatment*	*Secondary carcinoma*	*Features of interest*
Ascending urinary tract infection. Toxæmia.	Irradiation.	Nil.	Necrosis of vulva, vagina and bladder.
General carcinomatosis.	Repeated local excisions and irradiation treatments.	Cranium, pelvis, long bones, lungs, pleura, pelvic and femoral lymph nodes, skin, diaphragm, brain, dura, stomach, liver, spleen, pancreas.	Basal-celled carcinoma of Bartholin's gland.
Cardiovascular disease.	Irradiation.	Inguinal glands.	Died 2½ years after treatment commenced. Age 67.
Pneumonia.	No treatment. Moribund on admission.	Inguinal glands.	Duration of disease 10 years. Age 79.
Cerebral neurosyphilis.	Irradiation.	Inguinal glands. Iliac glands.	Huge sloughing tumour. Died 6 months after contact therapy, which had not much effect.
Cardiovascular disease.	Irradiation.	Inguinal glands. Skin of groin. Pleura.	Died 15 months after treatment. Age 76.

Taussig[8] has shown that a favourable cure rate only results from radical vulvectomy with complete extirpation of the gland-bearing areas. He presents these comparative figures: for simple vulvectomy 3 to 6 per cent five-year cures; for irradiation 12 per cent; and for radical vulvectomy 65 per cent.

Some interesting features are detailed in a post-mortem study of six patients who died in hospital. These are presented in Table III.

Table IV epitomizes several points which have been detailed. The patients have been grouped either under or over the average of 62 years, and then divided according to the duration of time following treatment. The relatively high late death rate in the younger group may be attributed to recurrence following inadequate treatment, and the high early death rate in the older patients is due to the high percentage of advanced disease in neglected cases.

A survival table, presenting a comparison of the various forms of treatment which the 59 patients received, shows clearly that radical vulvectomy is the treatment for carcinoma of the vulva. A provisional classification of three stages of disease is used so that the treatment groups may be more reasonably compared. Stage I is early localized disease, Stage II advanced disease, and Stage III advanced disease with positive gland involvement.

Naturally, the age and physical state of the patient will influence one's judgment regarding the line of treatment to be followed, but increasing experience has shown that the radical operation is not attended by the degree of shock which might be expected. During the last five years we have developed a routine technique for radical vulvectomy. After removal of the vulva

TABLE IV.

		Living or have died under 2 years	*Living or have died over 2 years*
Young	Living	8	4
	Dead	7	5
Old	Living	3	8
	Dead	21	3

Total..... 59

TABLE V.

SURVIVAL TABLE

Treatment	*No. of of cases*		*Time in years* –1	1–2	2–3	3–4	4–5	5+	
Irradiation	15	Living	1	0	0	0	0	2	(3)
		Died	8*	3	0	1	0	0	(12)
			Distribution by stages: I–4, II–6*, III–5						
Surgery	19	Living	1	5	3	2	2	0	(13)
		Died	2	2	0	1	1	0	(6)
			Distribution by stages: I–5, II–11, III–3						
Irradiation followed by surgery.	7	Living	1	2	0	1	0	1	(5)
		Died	1	1	0	0	0	0	(2)
			Distribution by stages: I–4, II–3, III–0						
Surgery followed by irradiation.	12	Living	0	0	0	1	0	1	(2)
		Died	4	2*	1	0	0	3†	(10)
			Distribution by stages: 1–3*†, II–6, III–3						

*Including one case of melanotic carcinoma.
†Including one case of Bartholin's gland carcinoma.
Total number of cases treated..... 53.
Six old patients were admitted unfit for treatment, four being almost moribund.

EXPLANATORY NOTE

1. The 7 patients in the group "Irradiation followed by surgery" included 3 who had radical vulvectomy after unsatisfactory response to irradiation. These are all living a year after operation. Two had simple vulvectomy for persistent leukoplakia and one for recurrent local carcinoma. Both are living, one nearly four years and the other five years after operation. Two patients had gland excision when irradiation failed to control extension. These patients died within a year of operation.

2. The group in which surgery was followed by irradiation included 9 patients where simple vulvectomy or local excision with superficial adenectomy was followed by irradiation to control late recurrence. All these patients have died*. One patient was old and had advanced carcinoma and simple vulvectomy with irradiation of gland areas was followed by death within the year. A patient with melanotic carcinoma had radical vulvectomy and post-operative high voltage treatment and died a year later. Two patients only are living—one with very early carcinoma had a local vulvectomy and post-operative high voltage and survives over five years, and the other a radical vulvectomy and post-operative contact therapy and survives over four years.

*The majority of these patients were referred to our clinic after operation had been performed.

TABLE VI.

Treatment	No. of cases		Time in years –1	1–2	2–3	3–4	4–5	5+	
Radical vulvectomy	16	Living	2	6	3	1	1	0	(13)
		Died	1	2*	0	0	0	0	(3)
			Distribution by stages: I–3*, II–9, III–4						
Simple vulvectomy	16	Living	0	1	0	2	0	2	(5)
		Died	4	2	1	1	1	2	(11)
			Distribution by stages: I–7, II–5, III–4						

*Including one case of melanotic carcinoma.

This table presents a comparison between the effectiveness of radical vulvectomy, *i.e.*, with double block dissection of the inguinal glands and simply vulvectomy. Three radical operations were performed following the Basset technique, the remainder by the method described in this paper.

a bilateral gland excision is performed. A semilunar incision is made from the anterior superior iliac spine to the pubic spine and is carried down to the superficial fascia. The gland-bearing fatty tissue of Scarpa's triangle is removed en bloc. The long saphenous vein is ligated and cut at the apex of the triangle and the whole mass of tissue is reflected to clear the fascia lata and clearly expose the fossa ovalis. The saphenous vein is ligated and cut where it enters the femoral vein, and the femoral canal is cleared of all fatty tissue, thus removing the highest lymph node of the chain—the gland of Cloquet. This operation is somewhat tedious but essential. Taussig[9] has said, "I think it no exaggeration to state that in nine out of ten operations done by the average surgeon for carcinoma of the vulva only the superficial easily accessible glands are removed." The principle embodied in this operation is similar to that stated by the late Blair Bell[10] in a paper published in August, 1936, shortly after his death. He agreed with Taussig that the radical operations of Kehrer and Stoeckel are not justifiable "for if the iliac glands are involved the disease has probably extended further". He pointed out that it seemed unnecessary to open the canals, for the femoral glands including the gland lying in the femoral ring can be removed without division of Poupart's ligament. Taussig,[11] who advocates the Basset operation, has given up the practice of dividing Poupart's ligament for some years, as he found that femoral hernia occasionally resulted. It is the opinion of most experienced operators that there is no necessity for enlarging the femoral canal by section of the adjacent ligaments. Nor are we impressed with the value of opening the inguinal canal, for there is no anatomical basis[12, 13, 14] for removing the round ligament as the lymphatics following it are efferent from the uterus toward the inguinal glands and do not, therefore, drain the vulva. Also, the Basset method of removing the iliac glands more or less blindly through the internal ring leaves considerable lymphatic tissue between the inner aspect of the femoral ring and the bifurcation of the iliac vessels.

Dr. G. E. Richards,[15] of the Institute of Radiotherapy, Toronto, presents the problem of treating carcinoma of the vulva by irradiation in the annual report for 1939 as follows:

"Carcinoma originating in the vulva presents a difficult problem from the standpoint of radiotherapy. In the first place the primary lesion is in the group of highly radio-resistant types of cancer while the tissues of the vulva are easily injured by radiation resulting in persistent œdema, vulvitis, or painful chronic ulceration, all of which are extremely unpleasant sequelæ. Where they can be avoided by surgical procedures it seems obvious that this is preferable.

"Secondly, carcinoma vulvæ is a difficult problem because of the fact that secondary involvement of regional glands may occur many years after the primary has been successfully dealt with either surgically or radiologically, and such secondaries are among the most refractory which occur anywhere in the body and can seldom be entirely controlled by any available form of radiotherapy, no matter how intensive—including x-rays at 200 K.V., or 400 K.V., and teleradium.

"The introduction of contact therapy during the past few years appeared to offer a method of treatment of the primary by which certain frail and elderly patients might be spared the necessity of submitting to radical vulvectomy, and in a few cases this type of treatment has been successful in causing the disappearance of local lesions. In elderly patients whose life expectancy is not great this degree of palliation is sufficient, whereas in an earlier age group it would not be, owing to the almost certain risk of local recurrence."

CONCLUSIONS

1. Carcinoma of the vulva is a disease of later life.

2. Neglect of symptoms results in an unnecessarily high percentage of advanced cases.

3. Radical vulvectomy offers a hopeful prognosis.

4. Simple vulvectomy and indifferent gland excision have no place in the cure of carcinoma of the vulva.

5. Radiotherapy is of value in the treatment of elderly patients.

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THE COMPARATIVE EFFICACY OF VARIOUS METHODS FOR ADMINISTERING INSULIN*

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COINCIDENT with the improvements in the treatment of persons with diabetes mellitus, new and perhaps radical views have evolved regarding the criteria for adequate control of the diabetic state. No longer is a persistently sugar-free urine, or even a normal blood sugar, insisted upon as the *sine qua non* in the treatment of every patient with diabetes. Himsworth[1] has subscribed to such a standard, the chief aim of which is clinical progress irrespective of the laboratory data. Priscilla White[2] now bases her control of juvenile diabetes upon the proportion of the ingested carbohydrate which is excreted in twenty-four hours. Rabinowitch[3, 4] regards post-prandial glycosuria in diabetics treated with protamine zinc insulin and a high-carbohydrate-low-calorie diet as innocuous. Kepler,[5] on the other hand, doubts the justification for the abandonment of our former attitude that a consistently sugar-free urine is the ultimate aim of the treatment of diabetes.

Obviously, the ideal objective is that which includes both the clinical and the chemical factors. Unfortunately, this is rarely attainable to a degree of perfection, and circumstances often are such that a middle-of-the-road course is warranted. It is not uncommon for certain "difficult" cases to exhibit a persistent hyperglycæmia and glycosuria for years, without the supervention of serious complications or disabilities. In view of the still unsettled question of the relationship of hyperglycæmia to the development of arteriosclerosis and the consequences thereof it is reasonable to assume that success in the treatment of diabetes can be achieved only if the fundamental disturbance of metabolism is kept adequately controlled, and the simplest indication of the acquisition of such control is the continued absence of hyperglycæmia, glycosuria and ketonuria. Sindoni[6] has emphasized the inadequacy of examinations of the urine for sugar apart from blood sugar estimations, as an index of the true state of diabetes.

If a patient has diabetes of a grade such as requires the aid of insulin, the quality and quantity of insulin best suited to his needs should be employed. The insulin requirements of many diabetics may be supplied by a single daily injection of protamine zinc insulin or perhaps of regular insulin. Often, however, the best results are attained by a judicious combination of both types of insulin whereby the desirable effects of each are gained.

Dissenting opinions have been expressed with regard to the most beneficial means for using the "quick" or regular insulin and the "slow" or protamine zinc insulin in combination with one another. Lawrence[7, 8, 9] and Graham[10] advocate that the two insulins be mixed in a syringe and given as one injection, claiming that the individual physiological properties of the two types of insulin are maintained under such conditions. Campbell, Fletcher and Kerr[11] mention their success in giving regular and protamine insulin as a single injection with a long, narrow-bore syringe and care in avoiding mixing of the fluids. On the contrary, Sprague

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et al.[12] state that regular insulin should not be mixed in the same syringe or injected into the same site with protamine insulin.

It may be argued that if multiple injections are necessary, the principle aim of modern treatment with protamine zinc insulin is at once defeated. In the manner of a compromise, I[13] devised a double syringe for the administration of protamine zinc and regular insulin with a view to limiting their admixture and at the same time avoiding a multiplicity of injections. In order to test the usefulness of this device as compared with the usual methods for administering insulin, the investigation described below was carried out.

INVESTIGATION

A comparison has been made of the relative efficiency of different combinations of regular and protamine zinc insulin and protamine zinc insulin alone judged by their effects upon the sugar content of the blood and urine. The study involved observations of 40 patients with diabetes of varying grades of severity who seemed to be stabilized satisfactorily as regards their diet and insulin dosages. Usually, the tests referred to below were carried out just prior to the patients' dismissal from the hospital. The series comprised 24 female patients and 16 males. Their ages ranged from 14 to 83 years, with an average of 51 years. In 20 of the cases amorphous insulin was given along with protamine zinc insulin, and in the remaining 20 the solution of zinc insulin crystals and protamine zinc insulin was prescribed. The term "regular" insulin, as used in this paper, refers both to the amorphous insulin and the solution of zinc insulin crystals.

The plan of experimentation was as follows: After a preliminary control period during which each patient was stabilized as well as possible on an adequate diet and appropriate insulin therapy, a series of daily blood sugar curves was made. The blood sugar estimations were performed by the method of Pickard and Pierce[14] upon samples of capillary blood obtained at 7.00 a.m. (fasting), 10.00 a.m., 12.00 m., 2.00 p.m., and 4.00 p.m. Also, the urine for each 24 hours was collected and its content of sugar estimated according to the procedure of Folin and Berglund.[15] The diet for each individual patient on each of the test days was identical as regards the quality and quantity of the nutrients, but the food values of the diets for the different patients varied. For example, the carbohydrate intake ranged from 80 to 215 g. and the fat 70 to 120 g. per day. The amount of exercise undertaken by each patient was controlled and kept constant during the test periods.

On the first day the doses of the two insulins were administered as two separate injections in different regions of the body. On the second day identical doses were given but the insulins were mixed together in the one syringe and administered as a single injection. On the third day the same doses were given by means of the double-barrelled syringe.[13] The next day the total number of units, *i.e.*, the sum of the doses of the protamine zinc and regular insulins was provided in the form of protamine zinc insulin only, but no special tests were made. The following day, however, the patient having received the same amount of protamine zinc insulin, the routine as described above was carried out.

The doses of the two main types of insulin varied considerably. In some cases, the quantities of protamine zinc and regular insulin were the same; in many they were different. When the latter prevailed, the dose of protamine zinc insulin was always greater than the dose of regular insulin. The greatest amount of protamine zinc insulin which a patient in this series received was 30 units and the greatest amount of regular insulin 28 units per day. The smallest dosage used was 8 units of each kind of insulin. In all instances the injections were made immediately before breakfast at 7.30 to 8.00 a.m.

OBSERVATIONS

As there was no essential difference in the response to the amorphous insulin as compared with the crystalline zinc insulin, the results for the two groups of patients are considered together.

Chart 1 depicts the spread of the blood sugar values for the 40 cases when they received: (1) protamine zinc and regular insulin as two separate injections; (2) the two insulins mixed in a syringe and given as one injection; (3) the two insulins administered by means of the double syringe; and (4) protamine zinc insulin only. The average blood sugar values and the average daily excretion of dextrose in the urine under the different conditions are represented also.

It is obvious that, in general, better control of the diabetes obtained when the insulins were injected separately or with the double syringe

Chart 1

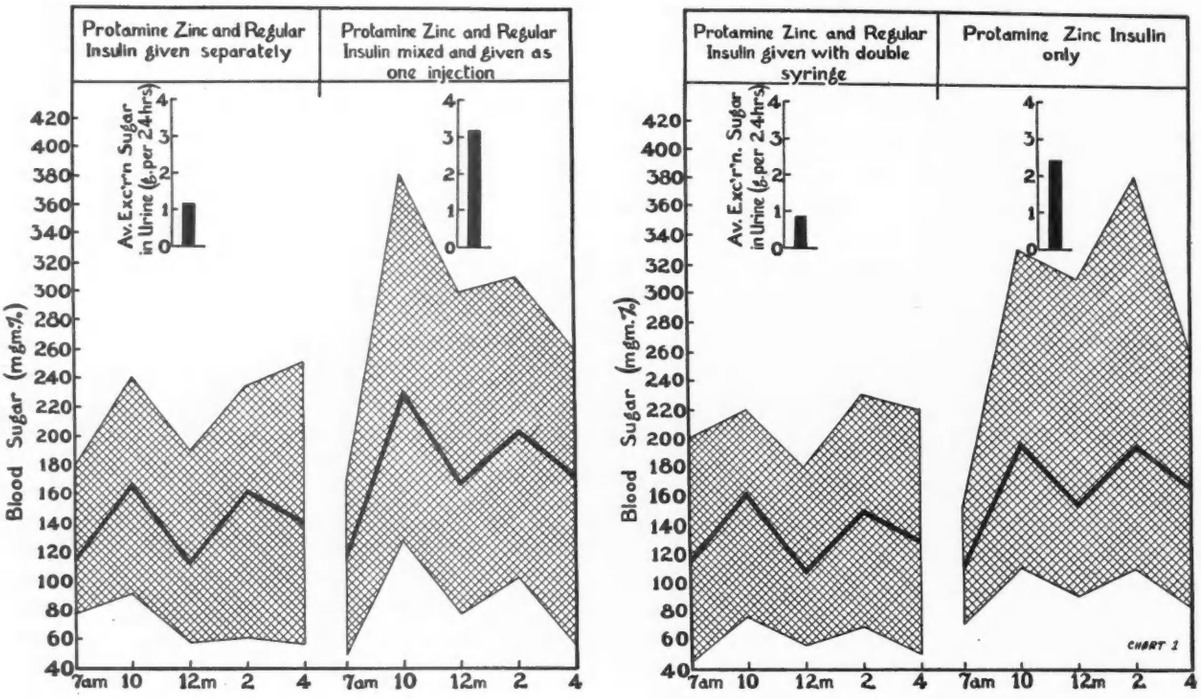

Chart 2

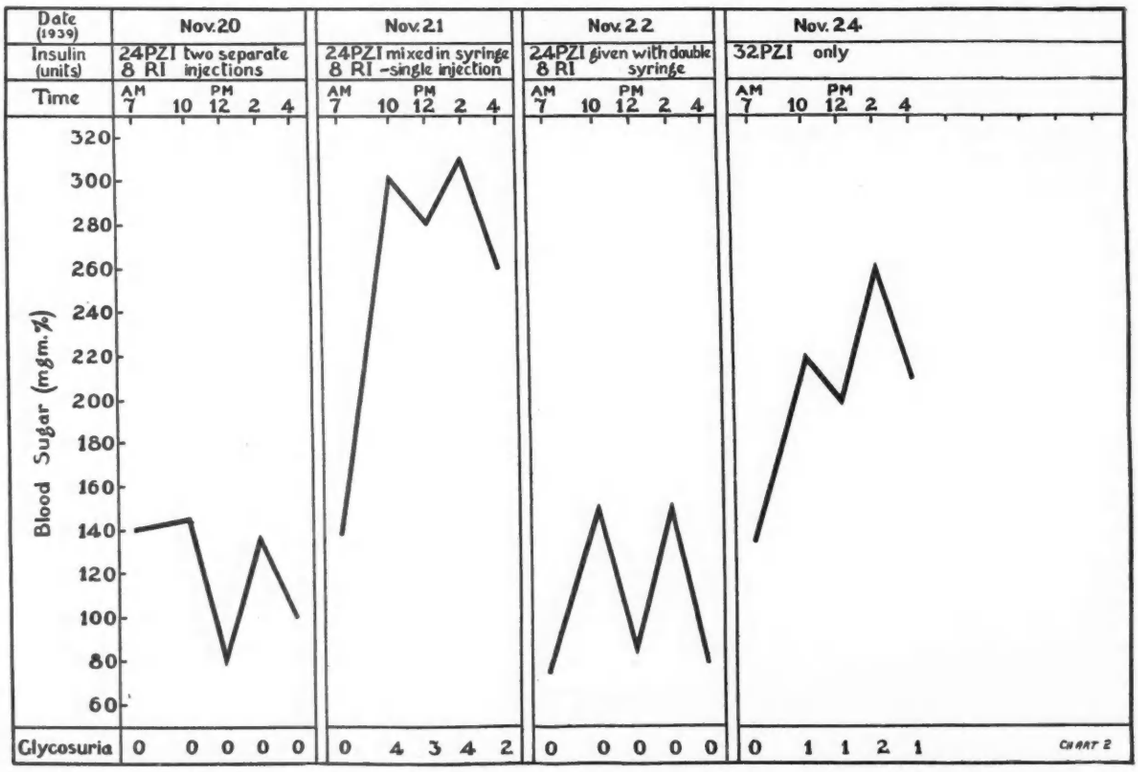

Chart 1.—Chart showing the range of the blood sugar values and the daily excretion of sugar in the urine of 40 diabetics under various types of insulin therapy. **Chart 2.**—T.P., a man aged 56 years; the diet during the period of study consisted of carbohydrate 175, fat 100 and protein 80 g. per day. An insulin reaction occurred at 3.00 a.m. November 22nd.

than when they were mixed, or when the total dosage was given as protamine zinc insulin alone. The findings in one case are represented by Chart 2 but such striking differences were not apparent in all of the patients as shown by an analysis of the results.

As stated above, all of the patients were subjected to the four methods of treatment, and on the basis of a rather arbitrary standard of control of the diabetes, *i.e.*, a post-prandial blood sugar which rose not above 200 mg. per cent, the results were grouped as follows:

Number of patients controlled by two separate injections—30 (out of 40).

Number of patients controlled by mixtures of the two insulins—12 (out of 40).

Number of patients controlled by the two insulins given with the double syringe—33 (out of 40).

Number of patients controlled by protamine zinc insulin only—20 (out of 40).

Perfect control of the diabetes in all of these cases was not obtained by any one of the four methods of insulin therapy, but some differences were evident and probably significant. Thirty-six of the 40 patients were controlled better by the separate injections or the use of the double syringe than by the mixtures of the insulins. Thirty-one were controlled better by the separate injections or the double syringe than by protamine zinc insulin alone. In 36 cases the excretion of dextrose in the urine was greater with the mixed dosage than with the unmixed insulins. In 28 the excretion of dextrose was greater with protamine zinc insulin alone than with the separate injections or the double syringe.

DISCUSSION

While the treatment of a diabetic patient must remain an individual problem, certain general principles evolve. If, for any reason, protamine zinc insulin fails to give the desired results, recourse should be had to the supplemental use of the quickly-acting regular insulin rather than to increasing the dose of the protamine zinc insulin to the point of producing hypoglycæmic reactions in an attempt to eradicate the glycosuria. The most effective means of administering these insulins concurrently is by some method which keeps them separated before and after their injection. When regular insulin is mixed with protamine zinc insulin apparently the former is converted more or less completely into the latter. Consequently, the protamine effect of the mixture predominates. Bjuggren[16] found that a mixture of regular and protamine zinc insulin administered in the morning exhibited a delayed action and affected the blood sugar to a greater extent during the night than during the day, an effect which contrasted with that of the unmixed insulins. As mentioned elsewhere[13] care in the manipulation of the double syringe and the deposition of the insulins in different areas with the one injection avoids their admixture in the subcutaneous tissues.

Whenever the two insulins are given separately but with the one syringe it is important, as pointed out by Graham,[10] to measure and inject the regular insulin first; otherwise, some of the protamine variety may be added to the regular insulin each time that it is used, thus converting a part of it into protamine insulin.

SUMMARY AND CONCLUSIONS

Observations of 40 diabetics show that in order to gain the individual physiological effects of regular and protamine zinc insulin, these must be administered separately. When mixed, the regular insulin is converted apparently into protamine insulin, and only the delayed action on the blood sugar, characteristic of the latter, is obtained. Many diabetic patients can be treated best by the judicious concurrent use of the two types of insulin.

Credit is due Miss M. Mains, R.N. and Mr. A. Barber, M.T., for their assistance in connection with this investigation.

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RELATION OF THE PULMONARY CONDITION TO BONE AND JOINT TUBERCULOSIS

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CONSIDERABLE literature is available on the pathology, location, treatment, and end-results in bone and joint tuberculosis. However, there are few observations on the associated pulmonary disease. As a matter of fact the early literature contains little information on the subject.

After the discovery that childhood disease, or so-called primary infection, was a definite entity we began to realize that this rather innocuous reaction to the tubercle bacilli left definite and recognizable pathological change in the parenchyma of the lung and the mediastinal glands. The improvement of x-ray technique and pathological examination led to a proper valuation of the life-history of childhood disease. It became apparent that this type of tuberculosis was widespread. We felt that a report on some 107 patients with bone and joint tuberculosis who have been treated at the Saint John Tuberculosis Hospital was justified.

This report covers a period of 17 years. We are fortunate in having x-ray films on both the pulmonary condition and the local bone and joint disease. It was necessary to review the earlier chest films in the light of the changing knowledge regarding childhood tuberculosis. The follow-up was also satisfactory.

Inasmuch as this article is mainly concerned with the types of pulmonary disease associated with bone and joint tuberculosis all other data are given to stress that the end-results of treatment are mainly dependent upon the pulmonary condition. We present the results in numbers and percentages, realizing the danger in presenting a small number of cases. However, such a plan definitely brings out the points we wish to raise.

Table I combines all the necessary information on 42 children treated. Table II serves the same purpose for 67 adults.

TABLE I.

TYPE OF PULMONARY TUBERCULOSIS, COMPLICATIONS AND END RESULTS, IN 42 CHILDREN 6 MONTHS TO 16 YEARS OF AGE, WITH BONE AND JOINT TUBERCULOSIS

Types of pulmonary disease—childhood complex.

Active	*Calcified, healed?*	*Pneumonic*	*Pleurisy with effusion*	*Miliarized*	*No discernible pulmonary disease*	*Unknown*
6 – 14.3%	14 – 33.3%	4 – 9.5%	5 – 11.9%	8 – 19%	3 – 7.1% Skin tests negative to 1 mg. old tuberculin, intradermic bovine and human.	2 – 4.9%

Present condition of patients

Active disease	*Healed*	*Dead*	*Discernible abscess*	*Sinuses*	*Other complications*	*Multiple bone lesions*
12 – 28.5%	28 – 66.6%	2 – 4.9% Meningitis – 1 Diphtheria – 1	25 – 60%	13 – 30.5%	Otitis media – 1 Pleurisy – 1 Peritonitis – 1 Adenitis – 1 4 – 9.8%	8 patients or 19%

It is interesting to note that some type of pulmonary tuberculosis was found in all but three children. In the latter without obvious pulmonary tuberculosis repeated intradermic tests with both bovine and human tuberculin proved negative. We, therefore, must consider that the original diagnosis was incorrect despite

the x-ray appearance. We believe that all may be classified under childhood type of tuberculosis.

X-ray evidence of a localized childhood type of pulmonary tuberculosis, active, quiescent, or healed was present in 47.6 per cent of the children; 9.5 per cent had acute tuberculous pneumonia; 11.9 per cent acute pleurisy with effusion. We wish to give special attention to the group called miliarized, constituting 19 per cent. The x-ray appearance is similar to that found in acute miliary tuberculosis. In some instances the picture was identical; in others the distribution was not so general. The cases fell into two groups clinically; the very sick child with high fever, rapid loss of weight, increased respiration, and other symptoms of toxicity, in whom the prognosis was considered hopeless; another group had surprisingly few symptoms in view of their x-ray appearance. These children present an interesting phenomenon. Despite the extent of the pulmonary lesion they all recovered, and x-ray films, taken months afterward, revealed no disease.

Inasmuch as we agree that most bone and joint tuberculosis is blood borne then we may assume that a miliarized disease in the lung should not be an uncommon phenomenon. Unfortunately, few children have been followed from the time of infection to the development of bone and joint tuberculosis. They are usually admitted to institutions long after the initial infection, and frequently with advanced bone and joint tuberculosis. It would be necessary to set up a place of frequent x-ray examinations at least once a month over a period of several years to determine whether the miliarized phenomenon is more universal than it appears. The phenomenon is obviously transitory as x-ray films, three months to one year later, show complete disappearance of the multitude of localized areas.

We have been unable to follow such a child through to autopsy and will therefore present such a history in a patient in the adult group.

Mrs. J.A., aged 47. The patient entered the Saint John Tuberculosis Hospital on October 26, 1938, and died on November 11, 1938.

In the fall of 1930 the patient noticed increasing fatigue, loss of weight and appetite. This continued without treatment until April, 1931, when pulmonary symptoms of shortness of breath, pain in the chest, and cough became evident. A clinical diagnosis of a non-tuberculous pneumonia was made and patient given general treatment. The general malaise and irregular fever to 102 to 103° continued. X-ray examination revealed a miliarized disease generally distributed throughout both lungs. She was considered to have acute miliary tuberculosis and a grave prognosis was given. However, she was placed on typhoid rest, and after many months of serious ups and downs her fever abated and she began to feel much better. Eventually all pulmonary and toxic symptoms disappeared, and with the improvement a complete clearing of the x-ray picture.

Four years later persisting back pain began, and investigation revealed Pott's disease involving the 7th and 8th cervical spine. A plaster shell was provided. Three years later urinary frequency, pain and blood appeared, and a cystoscopic examination revealed a tuberculous kidney and ureter on the left side. A nephrectomy and ureterectomy was done with improvement. For the past four months she had gradually failed, lost weight, a recurrence of fever to a maximum of 104° for short periods, 24 hours or more. She also has vomiting attacks lasting several days. She is much weaker than formerly.

Examination revealed a seriously ill woman, skin slightly but universally pigmented, a markedly thickened speech, sleepiness, no vomiting, taking liquids well; temperature 99.8°, pulse 120 and of fair quality. Later she had a vomiting attack and intravenous glucosaline was given with marked improvement. This improvement continued until November 11th, when she became comatose, with an imperceptible pulse, and cyanosis. Patient was drowsy, mentally dull, and speech thick; skin pale and slightly moist. At 10 a.m. she was unconscious with the pupils widely dilated, fixed and staring. The blood pressure could not be measured; heart sounds not heard; pulse not palpable, and at 10.20 a.m. she died.

Autopsy.—Thorax: Left side, no excess fluid, old dense adhesions at the apex. The right cavity obliterated by dense fibrous adhesions. On section the lung was pinkish grey in colour with some congestion at bases. There was no apparent increase in connective tissue. Multiple sections failed to show gross evidence of previous disease. Left: some adhesions at the apex with pleural scarring. The pleural surface was pinkish grey. The lung crepitated throughout except in the lower lobe where there were several shotty areas. On section the lung substance was dry, and pinkish grey in colour. The lower lobe in the lower portion showed about ten hard shotty areas about the size of millet seeds. There was no evidence of recent activity. The glands around the root of the lung and along the trachea were enlarged, firm and partially caseous. No special change in spleen, pancreas, liver or gall bladder was noted.

Gastro-intestinal tract: A polypus about 4 cm. in diameter and 6 cm. in length was present, protruding from the pyloric area. The pylorus showed marked hyperplasia. The ileum showed hyperplasia of the Peyer's patches and in the cæcum there was marked hyperplasia of the solitary lymph follicles. There was also an ulcer in the cæcum about 1.5 cm. in diameter, running transversely to the long axis of the bowel and showing contraction and fibrosis. It appeared to be tuberculous.

Kidneys: Left absent. Right appeared normal in size. The capsule was smooth and stripped easily. In one calyx there was a small caseous area about 6 cm. in diameter.

Bladder: Contracted and the mucosa was dark red and showed some early ulceration.

Adrenals: Left missing. Right, enlarged and massively infiltrated and destroyed by a tuberculous process.

Genital organs: No special change.

Head: No evidence of disease.

Spinal column: There was kyphosis in the thoracic area with fusion of the 3rd and 4th thoracic vertebræ. The lesion appeared healed with good union and calcification. The spinal cord showed no special change.

Microscopic examination confirmed the gross picture except that healed areas of tuberculosis were found

in the spleen, and the ulcer of the colon did not reveal a true picture of ulcerative tuberculosis.

Cause of death: Tuberculosis of the remaining adrenal.

The point we wish to make in this report is the marked clearing of the pulmonary tuberculosis—a complete disappearance of a miliarized disease with but little evidence of healed tuberculosis.

It should be noted that in the 17-year period only 2 children, or 4.9 per cent, have died, one from meningitis and one from diphtheria. In other words the pulmonary condition was eventually satisfactory. In this group of children some 90.5 per cent had either discernible (by physical findings or x-ray) abscess or draining sinuses. Other complications were few in number, and 19 per cent had multiple bone and joint lesions.

This Table shows many variations from Table I. The adults with either healed childhood tuberculosis, with or without pleurisy, constitute 31.4 per cent of the total.

One of three things could have happened to this group. The implantation of tubercle bacilli in the involved bone or joint at the time of the initial tuberculosis. These tubercle bacilli remain latent until some later mechanical or chemical accident occurred. Or such an accident may have been operable years later and already healed or partially healed pulmonary or glandular lesions were reactivated and bacilli were deposited in the blood stream. A third possibility was a lymphatic spread from contagious glands. The last appears a bit far-fetched.

Besides the more or less obsolete childhood tuberculosis we have bone and joint disease associated with adult pulmonary disease. The percentage found with miliarized disease was 4.1 per cent, one-fourth of that in children. This is to be expected because the childhood type of tuberculosis discussed in adults is about one-third of the total number of patients.

The most striking thing is the end-results of those patients with adult pulmonary tuberculosis. All deaths in adults occurred in this group. Tuberculous meningitis accounted for 20 per cent of the deaths.

TABLE II.

TYPE OF PULMONARY TUBERCULOSIS, COMPLICATIONS AND END RESULTS, IN 67 ADULTS, 16 YEARS AND OVER WITH BONE AND JOINT TUBERCULOSIS

Types of pulmonary disease.

Childhood healed	*Pleurisy with childhood complex*	*Adult minimal*	*Adult moderately advanced*	*Adult far advanced*	*Miliarized*	*No report*
14 – 20.9%	7 – 10.5%	5 – 7.5%	8 – 12.1%	21 – 31.4%	3 – 4.1%.	5 – 7.5%
	Pleurisy with effusion (healed) 4 – 6%					

Present condition of patients

Active disease	*Healed*	*Dead*	*Unknown*	*Sinuses*	*Discernible abscess*	*Other complications*	*Multiple bone lesions*
14 – 20.9%	29 – 43.6%	20 – 30% Pulmonary T.B.–14 Unknown – 1 Meningitis – 4 NOTE: Of the 21 patients with far advanced pulmonary disease 18 are dead.	4 – 5.5%	16 – 24%	14 – 20.9%	Genito-urinary –7 Spastic paralysis –1 Empyema –1 10 – 15%	9 patients or 13.4%

Discernible abscesses were fewer. It is obvious that it is difficult to visualize many lumbar abscesses, and undoubtedly the percentage would have been similar to that found in children. Open sinuses occurred in approximately the same percentage as in children. The complications were predominantly found in the genito-urinary tract. Multiple bone lesions occur in about the same percentage in either group.

CONCLUSIONS

1. In a series of 107 patients with bone and joint tuberculosis careful search revealed pulmonary disease, either active, quiescent or healed, in practically every patient.

2. The death rate is low in children and high in adults, and the greatest single factor is the intensity of the pulmonary condition.

3. Abscesses are found in a high percentage of patients, draining sinuses far fewer.

4. Other complications were found in 10 to 15 per cent. Involvement of the genito-urinary tract was the most frequent.

5. Multiple bone and joint lesions occurred in 19 per cent of the children and 13.4 per cent of the adults.

A SURVEY OF ENTOZOA IN ADULTS IN A TORONTO HOSPITAL*

BY E. KUITUNEN-EKBAUM

Toronto

HITHERTO-published surveys on the human parasites in Canada are those of Porter,[1] Fantham and Porter,[2] Brooks,[3] and Miller.[4] Fantham and Porter made an examination of stools of 563 patients in the Royal Victoria Hospital in Montreal. Their studies included male and female adult and infant patients. Brooks made a survey of 61 persons in Newfoundland. Miller examined the stools of 254 persons, of three different population groups in Saskatoon: (1) a clinical group of hospitalized and non-hospitalized patients of both sexes from 5 to 76 years of age; (2) a healthy group of male college students and student nurses; (3) a group of children, 2.5 to 18 years of age, in an orphan asylum. A survey of intestinal parasites in children[5] was carried out by the author in the Hospital for Sick Children, the Thistletown Hospital, and the I.O.D.E. Preventorium Convalescent Home in Toronto. The stools of 438 children were examined and 843 children were examined by the swab method.

The data presented in this paper are the results of a survey of intestinal parasites of a group of patients on the medical and surgical wards of the Toronto Western Hospital. The ages of the patients examined ranged from 14 to 90 years. Only one patient, 9 years of age, is included in the survey of enterobiasis. Stools were obtained the same or following day after passage and were examined by the saline and iodine smears and the flotation and centrifugation methods. Several samples were cultured. Liver extract, originally used by Frye and Meleney[6] in the culture medium for *Entamœba histolytica*, was used as follows: 0.5 per cent of Connaught Laboratories' 20 gram per c.c. intramuscular liver extract in an 0.85 per cent solution of sodium chloride was added to the sterile Loeffler slopes. A small amount of Difco's bacto-rice powder was added to each tube before inoculating the culture-medium. The survey for enterobiasis was made by the swab method. The cellophane-tipped NIH swab, as devised by Hall,[7] National Institute of Health, Washington, D.C., was used. The swabs were taken in the mornings between 7 and 8 o'clock.

RESULTS OF THE STOOL EXAMINATIONS

Fæcal samples of 324 patients, 157 females and 167 males, were examined; 94, or 29 per cent, were found to harbour some species of protozoa or helminths as shown in Table I.

TABLE I.

SPECIES OF PARASITES FOUND IN 324 PATIENTS IN THE TORONTO WESTERN HOSPITAL

Name of the parasite	*No. of instances*
Protozoa:	
Blastocystis hominis	28
Entamœba histolytica	1
Entamœba coli	20
Endolimax nana	10
Dientamœba fragilis	2
Iodamœba bütschlii	7
Chilomastix mesnili	5
Giardia lamblia	11
Trichomonas hominis	4
Helminths:	
Tænia saginata	1
Diphyllobothrium latum	1
Trichocephalus trichiurus	2
Enterobius vermicularis	1

Most of the protozoan parasites listed in the table are harmless, or may cause only slight symptoms. The pathogenicity of *Entamœba histolytica*, however, is well known. The dysentery amœba, *E. histolytica* was found in a male

* This work has been conducted in the Department of Hygiene and Preventive Medicine, University of Toronto, under Prof. Donald T. Fraser, with the aid of a grant from the Banting Research Foundation.

patient on the medical ward. The cysts were numerous in a sample obtained at the end of October, but later the organism was not found again, although several samples were obtained from the patient. It is, therefore, not known whether there was a confusion of the name written on the container or whether there was a period during which the cysts were not expelled. The cysts were cultured and the cultures were kept successfully over four months until discarded. The flagellate *Giardia lamblia* is another protozoan which occasionally may give severe symptoms.

Four species of helminths were found. The beef tapeworm, *Tænia saginata,* was diagnosed by eggs in the fæces. Several days afterwards the man expelled the proglottids. The eggs of the fish tapeworm, *Diphyllobothrium latum,* were found in the stools of a Jewish woman. The patient explained that she had been suffering from gastro-intestinal discomfort before she came to Canada from Russia eleven years ago. There is a possibility that the woman obtained the parasite before coming to Canada. The eggs of the whipworm, *Trichocephalus trichiurus,* were found in the stools of two women. In both cases the infection was apparently quite mild, as very few eggs were found in the stools. The pinworm, *Enterobius vermicularis,* eggs were found only once in the stools of a female after 4 swabs taken proved to be negative. The fifth swab was then taken on the following morning and was positive.

Results of the Swabbing for Enterobiasis

The swabs taken from 306 patients, 150 males and 156 females, showed 30, or 9.8 per cent positive for enterobiasis. The percentage of positives differed very little between the sexes, being 10.3 in females and 9.3 in males. A total number of 946 swabs, or an average of 3 swabs per person, was taken. From 1 to 4 swabs were taken from each patient, namely, 42 patients were swabbed once, 48 twice, 56 three times, and 160 four times. The patients positive for enterobiasis were of different ages: 1 person 9 years of age; 8 persons 14 to 20 years; 3 persons 21 to 30 years, 6 persons 31 to 40 years; 3 persons 51 to 60 years; 7 persons 61 to 70 years; 1 person 72 years and another 87 years of age.

The positive findings include one female who was negative on 4 swabs. Two days after the 4th swab a few eggs of *Enterobius* were found in her stools. Another swab was then taken on the following morning which was positive. This is probably explainable by the fact that the parasite had not yet reached the stage of discharging the eggs when the first 4 swabs were taken. In no other case were the pinworm eggs found in the stools although one or more stool samples were obtained from 27 patients positive on the swabs. This is due to the fact that pinworms do not deposit eggs in the intestine as do other vermian parasites. The female pinworms migrate and deposit the eggs at the perianal regions. The examination of stools for detecting pinworm infection is, therefore, quite useless, as in most of the positive cases the eggs cannot be found in the stools.

Discussion

The data given here can hardly be looked upon as representative of the Toronto population as a whole. The number of people examined is too small to draw any definite conclusions. The results obtained, however, are quite similar to those of Miller[4] in Saskatoon. He examined 207 adults and found 63, or 30 per cent, infected with various protozoa. The absence of helminths in his survey was probably due to the fact that the number of individuals examined was not very large and 58 of these belonged to a more or less selected group of healthy students.

The data presented here are also similar in those of Fantham and Porter[2] except that these authors found a much higher incidence of *Entamœba histolytica,* namely, 18 per cent. Porter[1] however investigated many cases of colitis and other intestinal complaints, the causal agent of which proved to be *E. histolytica.*

The present findings differ noticeably from those obtained from the examination of children.[5] The incidence of the protozoans as well as of the helminths has been found to be much less in the adults than in the children in Toronto. There are no published records on enterobiasis from other parts of Canada, though it is expected that among the rural and less civilized population in different parts of the Dominion enterobiasis may be more prevalent than it is in the city of Toronto.

Summary

The stools of 324 patients in the Toronto Western Hospital were examined for intestinal parasites, and 94 or 28 per cent were found

to harbour some species of protozoa or helminths. A group of 306 patients was examined by the swab method, and 30, or 9.8 per cent, were found to be positive for enterobiasis.

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STUDIES ON PINWORM INFECTION IN CANADA*

I. THE INCIDENCE OF PINWORM INFECTION IN FRENCH-CANADIAN SCHOOL CHILDREN

BY MAX J. MILLER AND LAURENT CHOQUETTE

Ste. Anne de Bellevue, Que.

RECENT improvements in diagnostic techniques for parasitic infections have shown that not only are parasitic infections more widespread than is commonly thought but that certain of them are comparatively common. The development of the NIH swab by Hall[3] for the diagnosis of pinworm infections made possible accurate and enlightening studies on this parasitic infection. These studies have shown pinworms to be surprisingly common. Further, from information gathered on the epidemiology of pinworm infections, it is seen that, unlike many other parasitic infections, they may occur at least as commonly in temperate as in warmer climates.

While most physicians, and particularly pædiatricians, in Canada are aware that pinworm infections are not uncommon in this country, accurate information as to the extent of its distribution is meagre. The survey carried out by Kuitunen-Ekbaum[4] in Toronto constitutes the only accurate survey for pinworms made in Canada. In the present investigation, the first in a series on the human pinworm infection problem in Canada, the results of a survey on the incidence of pinworm infection in school children in Quebec is reported. The survey was carried out in the village of Ste. Anne de Bellevue, Quebec.

The children were of both sexes and ranged from 6 to 16 years of age. They were all attending day school, and were considered to constitute a cross-section of the school-age population in an average Quebec village. The total number of children examined was 198, made up of 117 boys and 81 girls. The school authorities were most co-operative, and permission to swab the children was obtained from the parents by giving a circular letter to each child with instructions to present it to his or her parents. The letter contained information on pinworm infections and the plan and method of the intended survey, and instructed the parents to return the letter to the school, signed, and with the age of the child stated thereon, if they wished the child to be examined. Permission to swab the children was obtained for approximately half of those attending the school.

Examinations were made with the aid of the NIH swab. Only one swab was made in each case; the children had to be taken from their classes for the examination, so, unfortunately, the taking of more than one swab could not be arranged. The examinations were carried out from 9.30 a.m. to 2.00 p.m. of the same day, and there was no way of knowing whether or not some of the children had been bathed prior to being "swabbed". However, undoubtedly the large majority had not been bathed.

Results.—The number of children found positive for pinworms was 65, or, on a percentage basis, represented approximately 33 per cent of the number examined. The incidence among the boys was somewhat lower than that for the girls, being 29 as compared with 38 per cent. These results, obtained by the use of a single

* From the Institute of Parasitology, McGill University, Macdonald College, Ste. Anne de Bellevue, Que., with financial assistance from the National Research Council of Canada and the Faculty of Medicine, McGill University, Montreal.

swab, are undoubtedly lower than the true figures. Sawitz *et al.*,[5] and other workers, have shown that one swab will miss a certain percentage of the positive cases, and it has been estimated by the former workers that approximately 70 per cent of the positives will be found on a single swab examination, while seven swabs are necessary to ensure finding all positive cases. If these figures are applied to the results obtained in the present survey, we find that figured

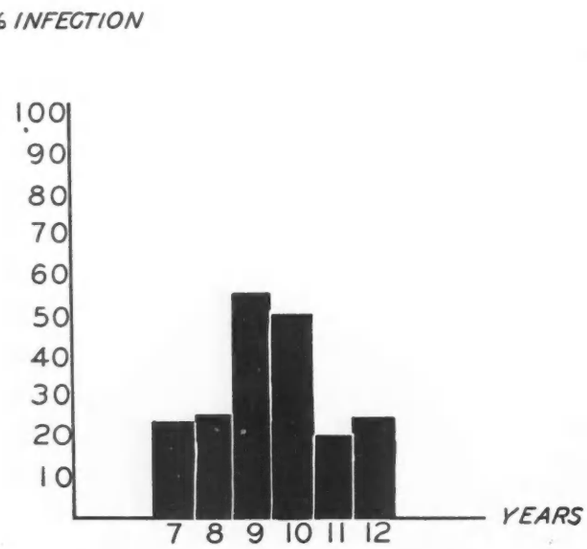

Chart 1.—The incidence of pinworm infections in year groups in children between seven and twelve years of age.

TABLE I.

THE PINWORM INFECTION RATE IN QUEBEC SCHOOL CHILDREN

No. examined	*No. positive*	*Per cent positive*	*Corrected per cent positive*
Boys.....117	34	29	40
Girls..... 81	31	38	54
Total.198	65	33	47

on the basis of seven swabs the general incidence of pinworm infection is 47 per cent, while the infection incidence for boys is 40, and for girls 54 per cent. The distribution of infection in the different age-groups was calculated for those years in which at least 20 children were examined, and this included children 7 to 12 years of age. It showed that children aged 9 and 10 showed a much higher infection rate than those aged 7, 8, 11, and 12. These results were found to apply to both the boys and the girls; the percentage infection rate by age obtained with one swab for children 7 to 12 years of age is presented in Chart 1.

DISCUSSION

The majority of pinworm surveys carried out since the NIH swab has become available have been with institutionalized groups. The results obtained, while of considerable interest, cannot be applied to the general population because the infection rate in such institutions is as a rule higher. This is well demonstrated by the results of Kuitunen-Ekbaum[4] who obtained an incidence of 73 per cent in an institutionalized group and incidences of 32 and 49 per cent in two non-institutionalized groups. Pinworm surveys on the general population are few and as far as we are aware the only extensive survey of this nature is that reported by Cram *et al.*[2] for Washington, D.C., in which 628 persons of different age-groups were examined and showed a pinworm incidence of 35.4 per cent. In addition, Chanco and Soriana[1] carried out a survey among the Filipino school children in a district of Manila, and out of 500 examined 75.2 per cent were found positive for pinworms, the girls showing a somewhat higher incidence of infection than that shown by the boys.

Regarding the higher infection rate shown by the different age-groups, it is difficult to understand the sharp demarcation in infection rates shown between the 9 and 10 year olds and those 7, 8, 11, and 12 years of age. It may merely be a coincidence due to the small numbers examined. On the other hand it occurs independently in both the boys' and the girls' group and may possibly be due to an age-tolerance or the playing habits of this group, which may be more suitable for the spread of the infection. In any case, too much significance cannot be attached to the results until many more children are examined.

SUMMARY

An examination of 198 school children from six to 16 years of age in a Quebec village showed 33 per cent to be positive for pinworms in one swab examination. Calculated on the basis of seven swabs it indicates that approximately 47 per cent of the children are infected with pinworms.

We wish to acknowledge with thanks the co-operation of the authorities of the Collège St. George and the Sisters of the Ste. Anne's Convent, and to express

our appreciation to Mademoiselle Rocher, of the Victorian Order of Nurses, for her assistance in taking swabs.

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STUDIES ON PINWORM INFECTION*

II. TESTS WITH GENTIAN VIOLET IN THE TREATMENT OF PINWORM INFECTION

BY MAX J. MILLER, LAURENT CHOQUETTE, WILFRED AUDET, R. F. KELSO AND J. A. GUENETTE

Ste. Anne de Bellevue, Que.

PROBABLY no other parasitic infection has had so many different drugs used in its treatment as has infection with pinworms. Yet, until recently, the pinworm remained the one intestinal helminth for which no satisfactory treatment was available. In a critical test of the anthelmintics more commonly used against pinworms, Wright and his associates[1, 2] demonstrated that santonin was relatively ineffective, that hexylresorcinol (caprocol), taken orally, had no apparent effect on the infection, and that tetrachlorethylene in single doses showed an efficiency of about 50 per cent. They found that hexylresorcinol enemata proved efficient in about two-thirds of the cases treated, but because of the expense of the drug and the labour involved did not consider it to be of great practical value. The use of warm water enemata has always been a very popular method of treatment and has some value in reducing the intensity of the infection. However, this method of treatment alone will not entirely eliminate the trouble, and at best affords only temporary relief. Because it is believed that the life-span of pinworms is comparatively short, treatment by rigid hygienic measures which would prevent auto-infection has been advocated. However, an attempt by D'Antoni and Sawitz[3] to eradicate pinworm infections by such methods alone proved quite unsuccessful.

The recent introduction of gentian violet appears to offer an efficient and relatively cheap method of therapeusis. The drug was first tested against pinworms by Wright, Brady and Bozicevich.[4] Further tests were reported on by Wright and Brady,[5] and by D'Antoni and Sawitz.[3] Their results showed the drug to be efficient in about 90 per cent of the cases when administered in divided doses over a lengthy period of time. Mild reactions to the drug were noted in some cases, but these were rarely severe and could be alleviated by interrupting treatment for a day or two.

Because of the trouble involved in getting some patients, particularly children, to take tablets over an extended period of time, and with the hope of entirely avoiding untoward effects of the drug, a study was made on the treatment of pinworm infections with gentian violet, using a short treatment period and a reduced dosage.

The patients treated were, with two exceptions, school children ranging from 6 to 13 years of age. They were all proved positive for pinworms by the NIH anal swab technique. Prior to treatment each child was given a physical examination, and a history obtained from the parents and child as to manifest symptoms likely attributable to the pinworm infection. The gentian violet was administered in ½ grain and 3/20th grain tablets,* having a water-soluble coating the thickness of which determines the disintegration time of the tablet. The disintegration of the tablets used was supposed to occur four hours after they were swallowed, thus providing for the largest concentration of the drug at the site of the infection. Treatment was given for a period of ten consecutive days.

* From the Institute of Parasitology, McGill University, Macdonald College, Ste. Anne de Bellevue, Que., with financial assistance from the National Research Council of Canada and the Faculty of Medicine, McGill University, Montreal.

* The tablets were supplied through the courtesy of the Seal-Ins Laboratories, Inc., Los Angeles, Cal., U.S.A.

Children, 6 to 9 years of age inclusive, were given two 3/20th grain tablets three times a day before each meal, and children 10 to 13 years of age inclusive, one ½ grain tablets, three times a day, before each meal; the former group thus received a total of 60 3/20th grain tablets and the latter a total of 30 ½ grain tablets. One week following the completion of the treatment an anal swab was made on each patient, and at weekly intervals two additional swabs were taken, making a total of three post-treatment swabs. More swabs could not be taken because of the objections of parents or the children.

A total of 38 children were given the tablets. Of these, two were unable to swallow them, two did not complete the treatment, and in three the complete number of post-treatment swabs could not be taken. Two sisters, aged 8 and 10 respectively, were in error each given the tablets meant for the other, one getting a heavier and the other a lighter than the prescribed dose.

Twenty-nine children took the prescribed dosage and had three post-treatment swabs. Of these only three were found still positive following treatment. The drug was therefore efficient in 26 out of 29 cases or in approximately 90 per cent. Regarding the two cases in which the eight-year old child was given the drug of the 10 year old and *vice versa,* the younger child was found to be worm-free following treatment, whereas the older one still retained the infection.

The effects of gentian violet on the patient could be studied in 31 cases where the entire prescribed dosage was taken. Of these 23 reported no ill effects from the drug; two reported slight abdominal pain; three, slight nausea lasting only one day; one, anorexia lasting one day; another, anorexia lasting for several days; and still another colicky pains with nausea. No child in the age-group tested and taking the prescribed dosage vomited. However, vomiting and anorexia occurred in the eight-year old child who was given the dosage of a 10 year old. A further case of vomiting occurred in a five-year old girl who was given a dosage of one 3/20th grain tablet thrice daily; vomiting occurred on the ninth day, together with severe abdominal pain and anorexia lasting for several days. Both children who showed symptoms of vomiting following treatment were underweight, had poor appetites, and the smaller child was extremely nervous. In most of the other cases the symptoms were so mild that treatment was not interrupted. However, in four cases where treatment was interrupted, with the exception of the five-year old child, symptoms disappeared and did not return with the resumption of treatment.

The histories of 41 pinworm-infected persons were taken, 40 of whom were children, and one an adult. The results showed that 30, or approximately 75 per cent, gave histories of symptoms that could possibly be attributable to the pinworm infections. The symptoms in order of frequency were as follows: nervousness in 14 cases, or 34 per cent; pruritus of the peri-anal region in 14, or 34 per cent; restless or agitated sleep in 13, or 32 per cent; nocturia in 6, or 15 per cent; grinding of the teeth in 3, or 7 per cent; abdominal pain in 2, or 4 per cent; and nausea in a single case. The history of the adult is rather interesting and is given in some detail.

CASE REPORT

The patient was a male, 38 years of age. He claimed to have acquired the infection two years ago and had been troubled with it ever since. His chief complaint was almost continual anal pruritus and the sensation of worms crawling about the anus. In addition he had periodic attacks of abdominal pain which he stated were relieved by the spontaneous evacuation of large numbers of worms. In fact, he claimed to be able to foretell the time when worms were going to be expelled by the onset of abdominal pain. He suffered from constipation and hæmorrhoids. He slept well, had a good appetite, and his general state of health seemed to be fairly good.

The patient was given 3 grains of gentian violet each day for a period of eight days when treatment was discontinued because he complained of slight nausea and anorexia. However, from the second day of treatment he reported passing large numbers of worms and the disappearance of the anal pruritus as well as the abdominal pain.

DISCUSSION

In the tests with gentian violet in pinworm infections carried out by Wright and Brady[5] treatment was given over periods of 10 to 16 days, and a dosage of 10 mg. per year of apparent age given. D'Antoni and Sawitz[3] gave approximately the same dosage over periods as long or longer. In cases where the drug was given for periods over 10 days both groups of workers gave the drug in two or more courses of treatment separated by treatment-free periods. These workers obtained an efficiency of about 90 per cent for the drug. In our series of experiments, using a dosage in most cases considerably less than that used by the above-mentioned workers, the drug was found to be about 90 per cent efficient. The fact that only three post-anal treatment swabs were taken

probably did not disclose all the positives. However, Sawitz *et al.*[6] have shown that three swabs will find approximately 90 per cent of the positive cases, so the percentage efficiency would not have been changed a great deal by the taking of seven swabs, the number found necessary by these workers for recovering all the positives. It appears, therefore, that the larger dosage is very little more efficient.

Using the smaller amount of the drug untoward effects were practically eliminated. Interruption in the treatment only occurred in four patients, although it must be admitted that some of the patients taking the drug forgot to take it for a day or two on several occasions, apparently, however, without detriment to the efficiency of the drug. As mentioned above, in the two cases where vomiting occurred both children were underweight and sickly, and in such cases the drug should be given with caution. Probably administering the drug in two-day treatment periods followed by two-day rest periods would increase the tolerance of such patients to gentian violet.

The advantages of shorter treatment periods and smaller dosages are the convenience, reduced cost, and the increased probability of absolute tolerance of the drug by the patient. However, it should be pointed out that a longer period of treatment decreases the possibility of reinfection, as the patient is "immune" to pinworm infection during the course of treatment, and in houses where pinworm infections have persisted for some time the danger of air-borne infection is present for a considerable length of time after the source of the eggs has been eliminated.

The question of the pathogenicity of pinworms has long been debated, and different opinions have been held. Some consider them quite innocuous, while others believe them capable of causing appendicitis and perforation of the gut leading to peritonitis. Brady and Wright,[7] in a study of 200 pinworm-infected persons came to the conclusion that in pinworm infections "symptoms may be caused by mechanical stimulation and irritation by the parasite, by allergic reactions, and by the transportation of pathogenic organisms to places where they may become pathogenic." They found the most common symptom to be restlessness and insomnia. However, they had no evidence to show that enuresis was more common in infected than in non-infected children. Our findings agree essentially with those above mentioned. While we unfortunately did not have a control group, the percentage of children showing nervousness and restless sleep is certainly higher than would be expected of a normal group of healthy children. The number of cases with gastro-intestinal symptoms is negligible and it can be stated that gastro-intestinal symptoms due to pinworm infections are not the rule. However, that such symptoms may occur is demonstrated by the history of the single adult treated for the infection.

One-third of the infected persons were conscious of an anal pruritus, and probably an additional number experienced the sensation in a lighter degree, and did not report it. This symptoms, of course, is probably entirely due to the infection. Our findings disagree with those of Brady and Wright[7] as regards enuresis. They found it no more common in the infected group than in the control group. The 6 cases we found were in children 9 to 13 years of age, and in these cases, constituting 15 per cent of the entire group of children 6 to 13 years of age, enuresis was definitely more frequent than the average for the same age-group. The symptom of teeth grinding which has always been considered a very good sign of worm infection was found to be relatively uncommon in the infected children.

SUMMARY

Gentian violet in tablet form was tested against pinworm infection in 29 school children ranging from 6 to 13 years of age inclusive. The drug was administered over a period of 10 consecutive days, the children 6 to 9 years of age inclusive getting two 3/20th grain tablets, three times a day, and those 10 to 13 years of age inclusive getting one ½ grain tablet three times a day. The drug was found to be efficient in approximately 90 per cent of the cases treated, as determined by three post-treatment examinations made by the NIH anal swab technique.

Untoward effects of the drug were practically negligible. Vomiting occurred in two children, one of whom was in error given more than the prescribed dosage, and the other, a child of 5, who was given three 3/20th grain tablets daily for nine days. Both children were under weight, with poor appetites, and it is suggested that the treatment of such cases be extended over a longer period, short treatment periods being

followed by treatment-free periods of equal length.

The history of 41 persons infected with pinworm showed the more common symptoms of pinworm infections to be nervousness, restless sleep, pruritus of the anal region, and nocturia.

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THE PSYCHONEUROSES*

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THE study of psychoneurotic conditions received an impetus from the occurrence of "shell shock" in the first Great War. The interest was renewed during the Spanish war, and military authorities today are very much alive to the problem created by this class of casualty.

Many papers have appeared in our journals pointing out the frequency of illnesses due to functional causes. Studies by Lewis and McKerracher[4] led them to conclude that one-third to one-half of all complaints coming to the doctor's office are without pathological background. After personal interviews on this subject with many practitioners of our acquaintance we arrived at similar conclusions. Harris[2] states: "Of 500 cases admitted to the Medical Clinic of the Boston Dispensary in 1935, 36 per cent were suffering from symptoms due to emotional maladjustment". Viner,[6] of Montreal, states in part—"Possibly one-half of all human ailments (exclusive of psychoses) are due to mental sources". In spite of the above opinions, we read in a recent issue of the *New England Journal of Medicine*[7] the following: "The fact that doctors do not know or fail to remember that emotions can cause physiological disturbances, means that many patients are not going to be given proper treatment. Many physicians still practise as though they thought that if no physical disease is present nothing is wrong with the patient except his imagination". Let me add that Massachusetts is famous throughout the world for its care of the mentally ill.

We have been deeply interested in this subject for years. The following remarks on it are based in part on a study of some of the available literature but chiefly on experience with actual cases coming under our care at the Homewood Sanitarium. We realize that there are many cases of functional disease which are so mild that they are effectively treated by a bottle of medicine, a pat-on-the-back, and the assurance that the trouble is not serious. It is not these but rather the more stubborn cases of functional illness that will now be considered.

DEFINITION AND CLASSIFICATION

The psychoneuroses constitute a very poorly-defined group of disorders. There is no clear line of demarcation between the psychoneurotic and the normal on one side, nor between the psychoneurotic and the psychotic on the other. Theoretically, however, they are functional disorders in which no psychotic symptoms are present. For the purpose of clarity, we submit here an arbitrary classification, but one which seems to us to be of practical value. The group is divided into five types of disorder as follows:

1. *Neurasthenia;* characterized chiefly by mental and physical fatigability.

2. *Hypochondriasis;* a condition in which the patient has the fixed but unfounded idea that he is suffering from organic disease.

3. *Hysteria*; there are many forms, for example, anæsthetic, paralytic, and those characterized by amnesia, stupor, etc.

* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Toronto, Section of Medicine, June 21, 1940.

4. *Psychasthenia;* under this name are grouped the cases suffering from phobias, obsessions and a tendency to compulsive behaviour.

5. *Anxiety states;* a continuous state of anxiety with exacerbations. Common physical manifestations are palpation, dyspnœa, nausea and diarrhœa.

Etiology

Forty years ago Janet[3] said, "Pathological heredity plays in hysteria, as in all other mental maladies, a rôle absolutely preponderant. However, a very great number of circumstances play the part of provocative agents." Even today the foregoing efficiently summarizes our knowledge not only of hysteria but, indeed, of all psychoneuroses. In our experience with psychoneurotics some form of mental abnormality has been evident in one or both parents of more than half of the cases. These individuals carried the double handicap of inheriting weakness from and also being reared by these same abnormal parents. The study of "pathological heredity" is very interesting but not very helpful from a therapeutic point of view in our present social order. The "provocative agents" are of great variety, but one might take time to mention a few of the commoner ones.

1. *General debility.*—In over half of our cases the general physical health is below par. By this I mean that the patient is anæmic, undernourished, has poor muscle tone, etc. Many have had one or more major operations, and one of our patients boasted of the following list, all done in a period of eight years—appendectomy, cholecystectomy and "readjustment of bowel", hysterectomy to stop hæmorrhage, resection of four inches of bowel, and "breaking down adhesions". Many patients and their relatives date the onset of the trouble from an attack labelled "influenza". Such an opinion is open to question, but one hears it so often that one is forced to wonder whether this disease we call influenza does not leave the patient with a feeling of weakness and general invalidism.

2. *Psychic trauma.*—One hears a great deal about emotional shocks as a cause of functional disorders. In actual practice we have been able to find few such cases. We have been impressed, however, with the number of our patients who carried some secret sorrow or had constantly to contend with some insoluble and unpleasant problem. We recall the cases of two young married women who were quite convinced that their husbands were unworthy of them. So firmly convinced of her misfortune was one of these women that, when seen six years after the marriage ceremony, consummation had not yet taken place. Another patient had a five-year old child who had suffered a birth injury resulting in partial disability, both physical and mental. Another case, in which the symptoms were particularly severe, resulted chiefly from the fact that the patient's husband had developed blindness about ten years after the marriage. I am sure you will agree that each of these people had a good excuse for giving in to her emotions.

3. *Endocrine disturbances.*—Blaming obscure conditions on endocrine disorders is a popular pastime. In the writer's opinion the benefits of glandular therapy in the treatment of psychoneuroses have accrued only to the manufacturers and purveyors of the extracts. MacFarland and Goldstein,[5] in a review of the literature on the subject of biochemical studies on the blood of psychoneurotics, reported a great many conflicting results. In short, they stated "The literature on the subject is in a chaotic state".

4. *Overwork* is another favourite excuse for illness of this type. The chief purpose of neurotic symptoms is to put up a front to hide the weakness that threatens to destroy the self-respect, and there is no more respectable front than "overwork". Unfortunately, most of these people have accomplished less than the average. They are, however, unable to shoulder heavy responsibilities, and it is reasonable to suppose that in many cases the nervous breakdowns would not have occurred had the individual in question stuck to some routine form of endeavour.

Diagnosis

In my student days we were taught that it was nothing short of criminal to make the mistake of labelling a patient's disorder as functional when actually it was organic. There did not seem to be the same feeling at all toward the mistake of labelling and treating a case as organic when it was really functional; in fact it seemed to be the "polite" thing to do. This attitude, of course, arose from the layman's habit of considering all forms of mental disease as a disgrace. This prejudice is probably as prevalent among laymen today as it was then, but we

believe that the medical profession is taking functional disorders more seriously.

The diagnosis of psychoneurotic conditions is usually an easy matter. In fact, a fair number of these patients will open their remarks with—"Doctor, I think it's my nerves". It is important in all cases to have a full history and a complete physical examination. The lengthy and earnest recital of symptoms will usually suggest the correct diagnosis, but the search for signs of organic disease should be none the less careful on this account. This does not mean that the patient must be x-rayed from top to toe, nor that the full resources of the laboratory should be called upon. X-ray and laboratory examinations should not be undertaken unless there is something in the physical findings or history to justify this procedure, as they serve to focus the patient's attention on his various organs.

To be concise, a diagnosis of psychoneurosis is warranted in a case where the symptoms are bizarre or unusually abundant and the physical findings entirely negative or of such a nature that they do not explain the symptoms. For example, Mrs. B. came to us complaining of general weakness, insomnia, dizziness, defective vision, a queer feeling in her chest, numbness in her arms, nausea, crampy abdominal pains, and bladder irritability. Physical examination revealed nothing more serious than a moderate degree of mal-nutrition.

So far, in discussing "diagnosis" we have dealt only with the problem of functional *vs.* organic. The problem of neurosis *vs.* psychosis may be equally difficult but is less important, as in many doubtful cases the treatment is the same regardless of the exact diagnosis. It is often difficult to determine in the first interview whether a patient is suffering from a psychoneurosis or a mild attack of depression (by "depression" we mean either the depressed phase of manic depressive psychosis or involutional melancholia). The early symptoms of schizophrenia may also be chiefly of a neurotic nature. In either case the course of the disease will usually decide the issue. The fundamental picture in the psychoneurotic case will not change, whereas the psychotic will probably develop more serious manifestations. It is important to differentiate between the neurotic and the mild depressive because the latter is prone to suicide while the former is not.

TREATMENT

We have now come to the most important part of our subject. It is also the most interesting but unfortunately the most difficult. Assuming that we are dealing with an individual of unstable emotional make-up, whose illness has been precipitated by one or more environmental factors, what should be our plan of attack and what may we hope to achieve? Admittedly, we cannot alter the basic personalities of our patients, but in many cases we can lead them to a better understanding of the nature of their illnesses, and we can help them to develop healthier habits of thinking. Perhaps we can do no more than show them that they are handicapped and unable to engage in life's activities to the full extent. If we can regulate their scale of living so that it comes within the scope of their abilities they will live much happier lives than if they are trying to compete on an even footing with others who have the advantage of superior emotional equipment. There are many organic diseases in which we cannot hope to do more than exercise control or alleviate the symptoms. The physician's achievements in the handling of arthritis, heart disease, diabetes and many other ailments are chiefly the result of his advice and guidance, with the addition of some medicine to relieve the worst symptoms. Has not the man who suffers from functional illness the right to expect that we will strive to do as much for him as we do for his brother whose ills are wholly organic? Many physicians feel that the results to be achieved in treating psychoneurotics do not justify the necessary expenditure of time and energy. It is true that the work is often time-consuming, and, to some, has unpleasant features. However, the practitioner who will give a little time to the study of psychological medicine, and who is willing to treat these cases with an entirely different technique from that used with his other patients, will achieve results gratifying to himself and his patients.

In many ways the general practitioner is the ideal physician for these people. Often he is well acquainted with family and other elements of the patient's background as well as with the patient himself. A knowledge of this background is essential to a thorough understanding of the problem. Thus the family physician has quite a start on the specialist who may experience great difficulty in getting a true picture of the whole situation.

In these days of highly specialized medicine it is difficult for us to remember that we are dealing with an individual and not merely a collection of systems which can be handed around to the appropriate specialist when sickness occurs. The writer was particularly pleased with the first sentence in a recently published work on psychiatry:[1] "This book tries to do justice to the principle that we need to treat the patient who suffers from a disease and not a disease-entity". Let us not try to blame all the symptoms on some microscopical pathology that can usually be found in any patient. Rather let us try to discover all the factors, physiological and psychological, that have combined to produce the picture before us, and keep them in mind as we tackle our problem.

It is quite useless for any expert to devise a system for treating the psychoneurotic and hand it out for general use like a table of dosage used in the administration of drugs. This was well demonstrated by the failure of the Weir-Mitchell treatment when it was put into general use. Weir-Mitchell believed that these disorders were due to physical exhaustion and the treatment was designed primarily to correct that condition. His evident sincerity and his forceful personality were sufficient to make the treatment successful in his hands, in spite of the fact that it was founded on a fallacy. Others tried to use it and failed because they lacked the zeal and sincerity of the founder of the system. The physician who hopes to treat functional disorders successfully should study the subject thoroughly and then develop the technique which seems to him most logical.

The successful treatment of a neurotic patient should begin with the first interview. Even though a definite diagnosis has not been made a certain procedure can be adopted which will be useful in the treatment of the neurotic and will do no harm to the patient whose trouble is organic. In the writer's opinion the following points are essential.

In the first place the patient should be given the opportunity to tell his story fully to an interested and sympathetic physician. This story will consist mainly of a recital of physical symptoms, but usually mention will be made of hardships that have been endured.

If we are to thoroughly understand the condition we are about to treat we need to know about the patient's inheritance, the sort of people he has had to live with at various stages of his life, what sort of physical health he has enjoyed, his struggles in the social and economic world, his successes and disappointments. If he does not volunteer information on these points it should be elicited by questioning. If a man has indigestion it may be more important to know that he lives with his mother-in-law than to know what he ate for breakfast. Of course, the physician is gaining, incidentally, information regarding the patient's mental make-up which is even more important than the above. One is not likely to get all the information the patient has to offer nor even all the physician needs in the first interview. In this case patience is not only a virtue; it is a necessity. We are not dealing with an emergency which requires prompt action. We are dealing with wrong habits of thought which can be altered only by a slow and well ordered plan of campaign.

When the story has been told the next logical step is to make a complete physical examination. If every system is covered carefully the physician will be surprised at the frequency of the remark "That's the first time I've had a thorough examination". Should the physical findings still leave one in doubt regarding the presence of organic disease then laboratory tests which will cast any light on the subject should be performed at once. If the findings are negative the physical examination should not be repeated. The temptations will be many, but yielding will indicate to the patient that the physician is not sure of his own diagnosis.

Having taken the history and completed our examination we are ready to give the patient the benefit of our opinion and advice. His interest lies chiefly in our brand of treatment and it requires a high quality of salesmanship to gain his attention while we explain our view on the mechanisms underlying functional disorders. During the history-taking the physician will have given some hint of his belief that the patient's symptoms are connected in some way with emotional factors. Often it is evident that the patient suspects such a situation, which is just the fertile soil we want in which to plant our seeds of explanation. One can begin by drawing attention to the many examples of physical symptoms due to functional causes in the so-called healthy person. Everyone has seen people faint at the sight of blood, vomit in the presence of a disagreeable odour, break out in a cold sweat

from fear. These will be recognized by the patient as physical responses to emotional stimuli. The next step consists in explaining to him that his symptoms of fatigue, palpitation, aching pains in the back of the neck, the lumbar region, etc., are due to emotional disturbances. Often he is ready to admit the presence of emotional conflicts, but if they are unconscious more time and more explanation will be necessary. This paper does not deal with Freudian methods. They, no doubt, produce good results in some cases, but to use them regularly in all neurotic cases would seem to us to be comparable to using a steam shovel and a fleet of heavy trucks for a task better accomplished by the use of a spade and wheelbarrow.

Dr. Clare, who has been my chief preceptor, has many times informed me that "Psychiatry is only common sense". Its particular application in these cases consists in pointing out the relationship of symptoms to emotional conflict, correcting those features which are capable of correction, and encouraging the development of a philosophical attitude toward those which cannot be altered.

Someone has described man as "A reasoning being who does not reason". Certainly the activities of a neurotic are governed mainly by emotions rather than reason. The neurotic is suffering from bad habits as surely as is the thumb-sucking or nail-biting child. It is no more possible to cure the adult by cold logic alone than it is the child. The indirect approach must be used and the feelings must be played upon. Lucky is the physician who possesses a strong personality and knows instinctively how to use it to influence these people. If we are not so fortunate, what measures can we use to appeal to the patient's egotistical nature and thus elicit his co-operation? One very useful plan consists in directing his daily activities according to a definite program. He will be impressed by the fact that you are so interested in the details of his life, and he will benefit also by the discipline which must be kept well disguised. The schedule must be varied from time to time, the activities being increased gradually as conditions permit.

Many difficulties will be encountered in the treatment of psychoneurotic cases. Very often the patient actually desires, consciously or unconsciously, to be sick. In these days of the widespread use of disability insurance, workmen's compensation, and so on, there is often a real profit to be gained by invalidism. In many cases the attention of physicians, nurses, friends, and the service given by long-suffering relatives is so dear to the hearts of these self-centred people that they just cannot bear to give up a position of pre-eminence to become one of the herd.

The next question that arises is, "Where should these patients be treated?" Obviously, the answer is different in different cases. Many of them can be successfully treated at home, or in nursing homes, indeed, some need not interrupt their regular work. There are others who do better under a hospital regimen. The question of choice of a hospital presents several difficulties. Many of these sensitive people object to entering a sanitarium; for still more it is economically impossible. Under present conditions a general hospital is unsatisfactory for most cases, whether they be of the private room or of the public ward class. In the first place the neurotic is quite over-shadowed by the patient with some serious physical ailment. In the second place it is altogether likely that his demands for attention will be met in the same way as are the needs of the majority, namely, by drug or other therapy calculated to relieve symptoms of organic origin.

An interesting experiment in group psychotherapy has been carried on at the New England Medical Centre in Boston with gratifying results. Under this plan a physician met a group of ten to fifteen patients once weekly to discuss their symptoms and give instruction and advice. This example might be followed in many large out-patient clinics where neurotics tend to collect in large numbers. If the experiment is successful the principle might also be applied in treating the more severe cases by setting aside a small public ward for this purpose. Such a ward would also be valuable as a training ground for nurses who are specially interested in this field.

The following abstracts of case histories of two of our patients might be of interest.

CASE 1

Mrs. A., a widow, fifty-five years of age, was admitted suffering slightly from symptoms of confusion and depression. She had always been of an emotional and clannish nature. In the course of a few years her husband and two other members of her family had died, and she had had to carry the responsibility for the care during the final illness of each one. The illness was precipitated by an accident which may have caused a slight concussion. Soon after she became depressed and complained of lack of energy and peculiar "weak spells". On admission she was found to be in

good physical health. Her mental attitude was variable. She was glad to talk of her past troubles and her symptoms, but became annoyed and emotional if questioned regarding more personal matters.

All that seemed necessary in this case was the protective care of the sanitarium. This woman had been forced to undertake responsibilities beyond her powers. The minor accident precipitated a hysterical condition characterized by stupor and sensory disturbances. When moved to a new environment where she was treated as a semi-invalid, given a sympathetic audience and some reassurance, she soon regained her equilibrium. In the two years that have elapsed since leaving the sanitarium there has been no recurrence.

CASE 2

Miss R., thirty-eight years of age, teacher in a junior college in Michigan, was admitted as a stretcher case in a state of acute agitation. She had lived with her elderly parents and assumed a good deal of responsibility in the home. The atmosphere was rather depressing, as her father was a cripple and her mother's health was failing as a result of advancing years. The illness had begun some months previously with symptoms of undue fatigue and emotional instability. She continued her work until six weeks before admission when she was forced to enter a general hospital to undergo a minor pelvic operation. While convalescing at her home she became depressed and restless and was readmitted to hospital. There her symptoms became accentuated. It became necessary to give her heavy doses of barbiturates to keep her from disturbing other patients. Visual hallucinations developed. She became almost unmanageable and was transferred by ambulance to Homewood Sanitarium. Physical examination was essentially negative, but she was suffering acute emotional distress. She fussed and whined much of the time, talked in a halting affected manner and demanded constant attentions. She spoke of "having dreams" and seeing pictures on the wall but seemed to recognize their unreality. She appeared to be utterly helpless, but the weakness proved to be purely hysterical. By means of encouragement and suggestion she was induced to use her limbs and kept gradually increasing her activities. Physiotherapy in the form of various kinds of baths and massage helped to give her a sense of well-being. She suffered two or three minor setbacks, but at the end of two months she was well enough to leave the sanitarium in order to complete her convalescence under the supervision of relatives.

SUMMARY

1. The classification, etiology and diagnosis of the psychoneuroses are briefly discussed.

2. The best results in the handling of these cases will be achieved by (*a*) a thorough study of the patient's physical and mental make-up, his family history and social background; (*b*) an explanation to the patient of the nature of his illness; (*c*) treatment that stresses psychotherapy as opposed to the methods which are ordinarily used in dealing with organic disease.

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THE DIAGNOSTIC AND PROGNOSTIC VALUE OF STERNAL MARROW EXAMINATION

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BONE-MARROW examination during life is a comparatively recent acquisition to the physician's diagnostic armamentarium. The first published work in this field was by Ghedini[5] who demonstrated the parasites of malaria and leishmaniasis in the tibial marrow of infants and young children. The tibia is a convenient site for obtaining marrow in very young persons, but the normal regression of active marrow, which begins in long bones at about the seventh year, makes this type of examination unsuitable for older patients. Further, Ghedini's technique required a surgical procedure which has been eliminated by more recent methods.

Seyfarth[8] first advocated the sternum as the ideal biopsy site, since it has the advantage of being readily accessible and of remaining in an active state throughout normal life. Both Ghedini and Seyfarth used a surgical technique requiring removal of a portion of cortex and underlying marrow. This method of examination is still preferred by many investigators, including Whitby and Britton[11] who advocate Custer's[2] technique, Rhodes and Miller,[7] and Dameshek *et al.*[4] The latter authors are of the opinion that biopsy material shows a far greater cellularity, a greater reticulocyte percentage, a greater number of erythroblastic cells relative

to granulocytes, and a greater number of early nucleated red cells. This procedure, however, requires an operating room technique, is painful to the patient unless an anæsthetic is used; the material obtained requires decalcification with the resulting delay in examining sections, and the staining reaction of pathological sections varies from that of blood films.

In 1927 Arinkin[1] published a method of sternal marrow examinations which is easily performed, almost painless, and usually reveals the required information. This technique has been found quite satisfactory by many investigators including Vogel, Erf and Rosenthal,[9] Vogel and Bassen,[10] Morrison and Samwick,[6] and Zanaty,[12] and in our hands has proved adequate. Practically all of these workers use a similar technique, the only variants being the type of needle used, the amount of fluid withdrawn, and the method of making the slides. Though various methods have been already published, it is thought advisable to include a short summary of the procedure we have employed.

Technique.—Every precaution is taken to ensure sterility of instruments, gloves, etc. The skin over the manubrium and sternum is carefully prepared with iodine and alcohol. In the mid-sternal line at the level of the third rib, a hypodermic needle is inserted at an angle of forty-five degrees cephalically, and the skin, subcutaneous tissues, and periosteum are infiltrated with 2 per cent novocaine. A small scalpel incision is made to facilitate entrance of an ordinary Kaliski transfusion needle. In some cases by grasping the needle firmly and exerting a steady pressure the marrow cavity may be entered, while in others two or three taps with small hammer may be required. A 20 c.c. Luer-Lok syringe is fitted to the needle to make an air-tight joint and negative pressure applied. In our experience a "tugging pain" is almost always felt when negative pressure is applied with the needle in the marrow cavity. This is the only uncomfortable portion of the procedure. When blood just appears in the barrel of the syringe the pressure is released, the needle withdrawn, and a dry sterile dressing applied. The negative pressure is released when blood first appears in the barrel of the syringe because prolonged suction will produce rupture of blood sinuses within the marrow cavity with resulting dilution of the marrow juice by peripheral blood. A large drop of the material obtained is placed on a glass slide and a count of the nucleated cells made, using the ordinary leucocyte count technique. In our experience this estimation has varied from 20,000 to 270,000 cells, though many investigators, Vogel and Bassen[10] have reported results as high as 1,100,000 cells per c.mm. The remainder of the material is used to make several slide or coverslip preparations and stained as required. The stains found most useful have been Geimsa, Jenner-Giemsa, Wright's, and Goodpasture's.

It is not considered within the scope of this article to discuss the diagnostic criteria for the differentiation of the various cell types, nor is it necessary to list the marrow cells found in the various hæmatological dyscrasias, as these subjects are adequately discussed in many recent hæmatological texts and articles. While there are admittedly a few major and several minor variances in nomenclature and classification of the normally found nucleated cell forms, the following, Custer,[3] is acceptable to most workers: myeloblasts, promyelocytes, myelocytes, metamyelocytes, segmented forms, promegaloblasts, megaloblasts, erythroblasts, normoblasts, megakaryocytes, reticulum cells, monocytes.

In addition to these types, dependent upon the amount of peripheral blood present, normal mature leucocytic forms are found. Lymphoblasts, lymphocytes, plasma cells, Gaucher's cells, and neoplastic types may also be observed, depending upon the existing pathological state.

There is as yet no absolute unanimity in the differential counts of normal marrow cells. This is illustrated by the variation in the reports of Custer[3] and Morrison and Samwick.[6] Sufficient agreement exists, however, to allow definite working ratios to be determined for the normal so that variants from these percentages may be considered pathological. The granulocyte-erythrocyte (G:E) ratio ranges from 85:15 to 65:35. The ratio of the erythroblastic and megaloblastic elements to the normoblastic forms (E:N) is approximately 20:80 and the proportion of non-segmented granular types to the segmented variety (N.S:S) is 55:45.

While examination of the sternal marrow is not necessarily a routine procedure in the investigation of every hæmatological problem it is frequently of the greatest diagnostic and prognostic assistance. Of the several recent instances in which this type of examination has been of assistance, the following case is one of great

interest, since it definitely excluded what otherwise appeared to be the obvious diagnosis and allowed the correct diagnosis and prognosis to be established.

CASE REPORT

Mrs. B.S., aged 28, a Jewish housewife, was admitted to the Medical Department of the Toronto Western Hospital, service of Dr. Cecil Young, October 26, 1939. Her past history was irrelevant, and the present illness, of only one month's duration, consisted of a nasopharyngitis followed by eight separate epistaxes including one attack on the day of admission. The third and last of these hæmorrhages of sufficient severity to require packing of the anterior nares. The only other complaints were those of weakness and mild epigastric distress for one month, moderate constipation for three years, and a slight increase in her menstrual flow of October 19th to 24th.

Examination revealed a well-nourished female, pale, but not appearing acutely ill, with a temperature of 98 to 100° per rectum. There were weeping ulcerated areas on either side of the nasal septum, but no other hæmorrhages were present in the nose, mouth or throat. The submaxillary lymph nodes were slightly enlarged, firm, and not tender. Examination of the thorax and its contents was not remarkable. Except for a mild epigastric tenderness, the abdominal examination was entirely negative. The skin appeared normal.

Detailed examination of the blood revealed the hæmoglobin to be 62 per cent (9.5 g.), with the erythrocytes numbering 3,400,000 and the leucocytes, 3,500 (Chart 1), the platelet count ranged from 30,000 to 40,000, with the bleeding time 6.5 minutes, the clotting time 6 minutes, and no clot retraction in 48 hours. The capillary resistance test, pressure cuff method, was positive. Differential leucocyte count (Table I) showed myelocytes 2 per cent, juvenile neutrophils 15 per cent, band neutrophils 13 per cent and segmenters 13 per cent, large lymphocytes 15 per cent, small lymphocytes 33 per cent, eosinophils 2 per cent, basophils 2 per cent, monocytes 5 per cent. The erythrocytes presented a slight degree of macrocytosis, polychromasia, and an occasional stippled cell. The reticulocyte count ranged from 0.5 to 2 per cent, and no nucleated red forms were seen. Platelets were very scarce, large, and occurred singly or in pairs.

Shortly after admission the patient developed petechiæ on her buccal and pharyngeal mucous membranes and the skin of her neck, trunk and arms. This finding, plus those of: (1) a positive cuff test; (2) failure of clot retraction; (3) thrombocytopenia, both by count and stained film examination; (4) slightly prolonged bleeding time, and (5) a clotting time within the upper limits of normality, pointed to a diagnosis of essential thrombocytopenic purpura. In view of the leucopenia, relative lymphocytosis, and marked shift to the left of the neutrophilic differential count, this diagnosis was questioned and a sternal marrow puncture was performed.

The differential count of the nucleated sternal marrow cells is as recorded in Table II. It is readily seen that there is a marked increase in immature cells of the myeloid series with a reduction of, and probably at the expense of, the erythroblastic elements (G:E ratio 95:5). A partial block in the development of the myeloid cells beyond the myelocyte stage is present. The information obtained from the marrow examination allowed us to state that although the patient had a thrombocytopenia, anæmia and a relative granulocytopenia, the underlying state which explains the whole physical and hæmatological findings is that of a myelogenous leukæmia in the sub-leukæmic phase.

During the two months from date of admission to death, the marrow examination was repeated on two occasions (Table II), and the peripheral blood examined on many occasions (Table I). The rapid rise in the leucocyte count during the last eight days of life, plus the blood film findings of undoubted myelogenous leukæmia, serve to sustain the diagnosis made after the first marrow puncture. The rapid termination of the disease is sufficient to place it as one of the acute type. In the later stages of her illness the patient developed severe hæmorrhagic ulcerative

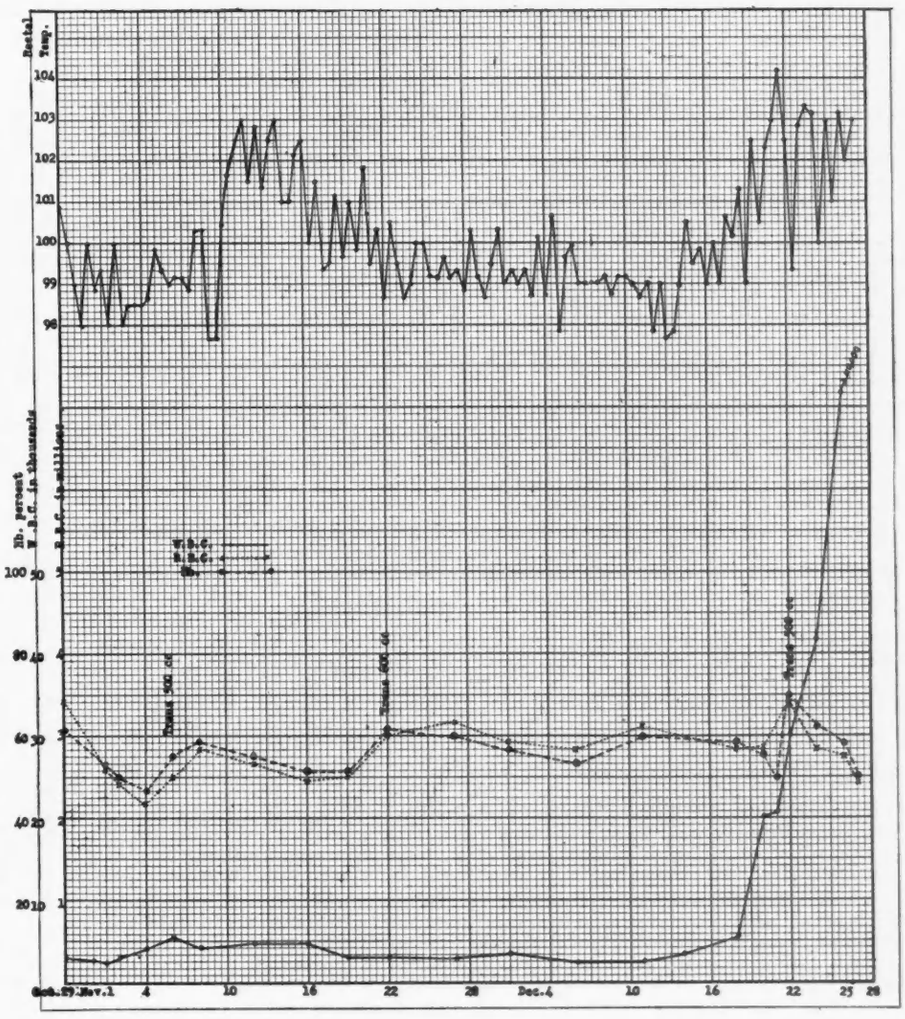

Chart 1

TABLE I.

DIFFERENTIAL PERIPHERAL BLOOD COUNTS

Cell type	*Oct. 30*	*Nov. 7*	*Nov. 16*	*Nov. 24*	*Dec. 6*	*Dec. 11*	*Dec. 14*	*Dec. 20*	*Dec. 24*	*Dec. 27*
Leucocyte count....	3,100	4,400	5,000	3,700	2,900	3,000	5,800	20,100	42,000	110,000
Segmenters.....	13.5	19.0	16.0	14.0	11.0	12.5	1.0	1.5	1.0	1.5
Band.....	12.5	26.0	42.0	20.5	15.5	8.0	6.5	8.0	6.5	4.0
Juvenile.....	15.0	6.5	5.0	3.5	1.0	1.0	1.0	10.5	11.0	10.5
Myelocytes.....	2.0	6.0	4.5	3.0	1.5	4.5	2.5	50.5	48.5	53.5
Myeloblasts.....	0.0	1.0	3.0	1.5	1.0	1.0	2.0	16.5	23.0	28.0
Lymphocytes.....	48.0	32.5	24.5	50.0	67.5	66.5	82.5	10.0	6.5	1.5
Monocytes.....	5.0	4.5	3.0	4.5	2.5	4.0	1.5	0.5	1.0	0.0
Eosinophils.....	2.0	2.0	1.0	2.5	0.0	1.0	1.5	1.0	0.5	0.0
Basophils.....	2.0	1.0	0.0	1.5	0.0	0.0	0.5	0.0	0.0	0.0
Normoblasts.....	0.0	1.5	1.0	0.0	0.0	1.5	1.0	1.5	2.0	1.0
Platelets.....	35 M	30 M	85 M	150 M	120 M	100 M	121 M	150 M	140 M	60 M

TABLE II.

DIFFERENTIAL CELL COUNTS OF STERNAL MARROW

Cell type	(*Custer*) *Normal*	*Nov. 9*	*Patient Nov. 17*	*Dec. 22*
Undifferentiated.....	0.0	0.5	0.0	1.0
Myeloblasts.....	0.6	2.0	7.0	16.0
Promyelocytes.....	9.0	13.0	25.0	26.0
Myelocytes.....	36.6	72.0	29.5	37.5
Metamyelocytes.....	14.6	5.0	18.5	8.0
Segmenters.....	3.0	2.0	12.0	8.5
Total.....	63.8	94.5	92.0	97.0
Promegaloblasts.....	0.0	0.0	0.0	0.0
Megaloblasts.....	0.0	1.0	0.5	0.0
Erythroblasts.....	14.8	3.0	3.5	0.5
Normoblasts.....	18.2	1.0	3.0	2.0
Total.....	33.0	4.0	7.0	2.5
Reticular cells.....	1.2	0.5	0.5	0.5
Megakaryocytes.....	1.0	0.0	0.0	0.0
Endothelial cells.....	1.0	1.0	0.5	0.0

lesions of the gums, mouth and throat, with cervical lymphadenopathy, and during the final few days her spleen was definitely palpable and tender. Post-mortem examination was unobtainable.

The above case report is one in which the examination of sternal marrow allowed an early accurate diagnosis to be made. Without this procedure it is probable that a diagnosis of essential thrombocytopenia would have been considered tenable. Marrow examination of cases of agranulocytosis, which will be reported at a later date, have enabled us to predict the ultimate outcome. Similarly in a variety of other hæmatological states, this type of examination has been of great diagnostic and prognostic assistance. Our results confirm the opinion of others, that marrow puncture is often an essential procedure in the diagnosis of obscure hæmatological states.

SUMMARY

1. The diagnostic and prognostic values of sternal marrow examination are presented.

2. A simple painless procedure is described.

3. The value of the examination is illustrated by one of the cases in which it has been found to be of the greatest assistance.

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CANCER OF THE RECTUM*

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IN the period between the close of the last war and the beginning of the present one there have been many changes in surgical procedure. This period covers the writer's student days in medicine, his post-graduate preparation, and some thirteen years in surgical practice.

During the period spent as a student and a house surgeon cancer of the rectum was considered a relatively hopeless problem. The great majority of cases which came to the hospital were in an advanced stage, and even if they were in an early stage the surgical attempts at removal were fraught with considerable risk. The profession generally was inclined to regard rectal cancer as a divine visitation, one over which man had little control, and sent these cases to hospital only when obstruction was imminent, or when the nursing problem became too complicated.

The impression which existed in the public mind was that it was better to die by natural causes than to put up with the discomfort of a colostomy, a calamity of which they had usually heard from some sufferer in the neighbourhood.

In the last twenty years, due to the persistent efforts of Miles, Lockhart-Mummery, Jones and others, the problem of an adequate surgical removal for cancer of the rectum with a reasonably low mortality has been successfully solved. In the last two years Devine has shown that growths at the recto-sigmoid may be removed safely, with the retention of the anal sphincter. Sufficient time has not elapsed to judge whether the final results will be as satisfactory as the Miles operation.

In the Toronto General Hospital, during the period from 1920 to 1925, 57 cases of rectal cancer were admitted to the public wards. Only 6 of these were subjected to an operation for cure; 90 per cent of the group were judged to be inoperable. There was one death due to operation; 3 patients died within fifteen months; one lived for nine years and died of carcinoma of the stomach, and one was untraceable.

During the period from January 1, 1930, to January 1, 1940, 110 cases were admitted to one service in the same Hospital. There are three such services, so that this figure shows a trebling, roughly, of the number of admissions per year. It is an indication not that cancer of the rectum is on the increase, but that both the profession and the public realize that cancer is a disease which may be healed successfully if recognized and treated sufficiently early in its course. The operability rate in this last group was 63 per cent instead of the 10 per cent in the previous series.

Diagnosis.—Fortunately the pathology of the origin and spread of rectal cancer is now well understood, and consequently accurate diagnosis may be made by the examining physician in the early stages if he does a digital examination and visualizes the rectum with a lighted instrument. All rectal cancers begin either as a polypus or as an ulcerating plaque. All rectal cancers show blood as an early symptom. It is true that the ordinary patient may regard bleeding as being due to hæmorrhoids, and delay the seeking of advice. There is some excuse for the patient, but there is none for the doctor who, listening to the story of bleeding, is satisfied to accept the patient's diagnosis of hæmorrhoids without doing an examination. Every case of rectal cancer may be diagnosed in the examining room. Sections may be taken to confirm such a diagnosis. Reference to the radiologist is unnecessary, and indeed may be misleading. It is frequently impossible to see the rectosigmoid junction and certainly the radiologist should not be expected to find rectal cancer in the ampulla.

Operability.—The greater number of cases now subjected to operation, compared with 15 years ago, is not altogether due to earlier diagnosis. Cases with apparent fixation to the prostate or sacrum may, after suitable preparation, prove to be operable. It is frequently impossible to say that a case is inoperable without opening the abdomen and examining it from above. If the growth has broken through the pelvic floor and there are peritoneal implants, it is useless to attempt a cure; secondaries in the liver indicate that the case is inoperable.

* From Second Division, Toronto General Hospital. The review noted is of patients treated by the surgical staff of the Division and followed through the out-patient clinic for rectal disease.

So-called palliative removal of the rectum in such cases is not justified. Fortunately, rectal cancer is usually slow growing, slow to invade the lymph glands, and, compared with other growths in the gastro-intestinal tract, it does not travel by the portal blood to the liver nearly so frequently. Advanced age is not necessarily a contraindication. It is important to know the kidney function, as indicated by the non-protein nitrogen in the blood, the pulse pressure, and the general condition of the vascular system. It may, in certain instances where there is urinary retention due to postatic enlargement, be necessary to deal with the prostate by the transurethral method before doing the rectal surgery. Pre-operative transfusion should be given in all cases, and donor blood should be available for further transfusions after the operation, if required.

Operative procedures.—Cases coming with acute obstruction due to recto-sigmoid cancer, are best dealt with by blind cæcostomy. A review of colostomy done for acute obstruction shows a remarkably high mortality, whereas a cæcostomy may be done with the minimum risk and is a life-saving procedure. Cases with mild or moderate degrees of obstruction should have at least one week's preparation in hospital. During this time they are kept on clear fluids and are given a daily purge with magnesium sulphate as well as colonic irrigations.

The one stage abdomino-perineal resection described by Miles is the most radical and satisfactory operation for rectal cancer, but it is a mistake to believe that is applicable to all cases. In spite of diligent preparation, it may be found that the lower bowel is not sufficiently clear when the abdomen is opened. In such cases the patient should have the procedure in stages, the first stage a division of the colon, after the method of Lahey, and the second part, the resection, done only after the distal loop has been washed clear for twelve to fourteen days. In certain older persons who for various reasons are not considered to be good surgical risks, if the growth is in the lower rectum, a preliminary colostomy followed in two weeks by a perineal resection is the operation of choice. Occasionally in the older individuals with higher growths a preliminary colostomy followed by an intra-abdominal resection of the growth and turning in the lower segment of the rectum is the operation indicated. The Devine operation has the very great advantage of leaving the patient with a natural anus. After a limited experience I am convinced that it is indicated in those growths at the recto-sigmoid or a little higher where a Mickulicz operation is impossible for lack of mobility, and yet where the ischio-rectal fat is practically certain to be free from invasion. Such an operation allows one to be just as radical in clearing out the glands in the mesorectum and the hollow of the sacrum. It is not possible in growths well below the peritoneal reflection because of the inadequacy of removal of the surrounding tissue. One should weigh each case on its own merits and decide carefully what is the operation of choice.

Prognosis.—In the period under review 110 cases were studied, 72 patients being subjected to surgical procedures. Of these, 2 were suffering from epithelioma of the anus. One of these was treated by preliminary colostomy followed by perineal excision and implantation of radium. He is alive after five years. The other patient with epithelioma, treated by perineal excision, died in 12 months of recurrence. Nineteen cases were treated by perineal excision. There were 2 deaths due to operation; 5 patients are living, under 5 years; 5 are living, 5 to 8 years; 7 have died, 6 of their original disease, and 1 of heart disease.

Forty-eight cases were treated by abdomino-perineal resection, 32 in one stage and the remainder in 2 stages. There were 3 deaths, a mortality of 6.3 per cent. Eleven patients are alive and well for 5 years and over; 21 are alive and well under 5 years; 13 have died since leaving hospital, two of causes other than cancer.

The majority of the recurrences occurred within two years. There were two patients in whom, following a colostomy, an intra-abdominal resection was carried out, leaving the rectal stump. These are both alive and well after two years.

One patient in this group was subjected to the Devine operation. It is now 8 months since he left hospital and he is carrying on his usual work. Aside from this man, the writer has had an opportunity to operate on 4 other patients by this method, but only within the past year. The maintenance of the anal sphincter and the apparent safety of the operation are sufficient compensations for the rather prolonged period in hospital and the various stages of operative procedure necessary.

The mortality rate in all types of operation was approximately 7 per cent. These 5 deaths

occurred early in the period under review. There have been 30 consecutive operative cases since October, 1937, without a death.

Radium.—Radium was used in 3 cases. In two instances very aged, infirm patients were treated by implantation of radon seeds in small low growths. One died of metastases in twelve months. The other is still under observation at fourteen months. A third case, with a small malignant rectal polyp, was treated by excision with diathermy and the implantation of radon seeds at the base. He is under observation after 18 months. Radium generally has a very limited field in the treatment of rectal cancer.

One patient was treated by fulgurization. She was an aged woman with a large growth and was not likely to ever be competent to look after her colostomy. She has since died of cancer.

Of the remaining 35 patients who were judged inoperable 22 were given colostomies. The remainder died shortly after admission or left hospital without any treatment.

Colostomy care.—Each patient is taught before leaving hospital the proper way to care for his or her colostomy. Irrigations are advised at the time of the day most convenient for the individual. For the most part, with a little dietary care and discretion and daily irrigations, it is unnecessary to wear anything except a supporting belt over a piece of lint which covers the opening. Such patients can and do go about their ordinary work with little or no inconvenience. The colostomy opening may tend to become stenosed after some months, and occasionally has to be dilated under gas or local anæsthesia.

CONCLUSIONS

1. Rectal cancer is being sent to hospitals for surgical treatment more often and in an earlier stage than was the case twenty years ago.

2. Many patients, however, who would at that time have been judged inoperable have, with newer methods of approach, a very fair chance of cure.

3. The surgeon who operated on rectal cancer should not become an enthusiast about one special operation, but should choose that procedure which is best suited for the particular individual.

4. Of a group of 66 patients, 16 (24 per cent) who were subjected to abdomino-perineal or perineal resections are alive and well for 5 years or more; 26 others (39 per cent) are alive and well for period of 1 to 5 years.

5. The general operative mortality rate of approximately 7 per cent is showing improvement with careful pre-operative preparation and careful judgment in choosing the particular procedure suited to each case.

Case Reports

A CASE OF FATAL SERUM REACTION

BY R. FERGUSON

Montreal

A boy of 6 years was brought to the surgical outdoor of the Western Division of the Montreal General Hospital on November 3, 1938. He had been struck by an automobile at about 2.15 p.m. He had not lost consciousness and was bright and co-operative. There were multiple abrasions of the face about the mouth, nose and eyes, with a deep laceration of the upper lip and above the bridge of the nose, with possible fracture of the nose. There was a laceration over the sternal end of the left clavicle but x-ray revealed no fracture. There was a hæmatoma in the occipital region of the scalp, but examination of the central nervous system was negative. There was no evidence of internal injury. The heart and lungs were normal and the urine was normal. In view of the fact that all the abrasions were covered with street dirt and some of them were rather deep antitetanus serum was given. At 3.05 p.m. 3 minims of tetanus antitoxin were given intradermally into the right forearm. At 3.07 p.m. evipal was started intravenously, and in eight minutes 5.5 c.c. had been given, which we thought to be enough. There had been no premedication and the patient went to sleep quite easily with some slight twitching. There was no appreciable change in the pulse and only slightly shallower respiration. The colour remained good.

At 3.20 p.m. the patient suddenly began to have trouble getting air into the lungs and would not breathe, although the airway was free. The chest was held in a tightly contracted state of full inspiration. Artificial respiration was begun in an effort to get some exchange of air in the lung, and an endotracheal catheter was passed within a very few minutes of the onset. Carbon dioxide, 10 per cent, and oxygen, 90 per cent, were blown gently through the endotracheal tube. Adrenalin, 5 minims, was given subcutaneously. The pulse remained strong.

At 3.30 p.m. a large wheal was noticed at the site of the intradermal injection of the tetanus antitoxin. The whole flexor surface of the forearm from the wrist to the elbow was reddened and œdematous. The pulse was now becoming irregular and 10 minims of adrenalin were injected subcutaneously, followed by 1.7 c.c. of coramine intravenously. The pulse improved appreciably following this. The pupils were not dilated. The eyes were moist but there was no corneal reflex.

At 3.45 p.m. the pulse again became weaker and an intravenous injection of 5 per cent glucose in saline was started. The patient began to take spontaneous breaths of a forced inspirational character

in which all the accessory muscles of respiration were called into play. At 3.50 p.m. respirations were beginning to become of a more normal character. The patient began to pour out large quantities of frothy, blood-stained fluid from the lungs. The intravenous injection was stopped after 350 c.c. had been run in, and the patient was placed in the Trendelenberg position to facilitate drainage.

At 4.25 p.m. the patient's condition was much improved. His colour was good and his pulse was strong so that he was transferred to the ward. Temperature 101.3°; pulse 156; respirations 24. At 5.15 atropine, gr. 1/300, was given to check pulmonary œdema. Oxygen was being administered continuously through the endotracheal catheter. At 5.30 p.m. the patient suddenly stopped breathing and could not again be revived.

Death was considered to be due to anaphylaxis.

Post-mortem report.—The trachea and bronchi contained frothy sanguineous material.

The lungs were crepitant only along the diaphragmatic margins. Almost the whole of the right and left lungs showed hæmorrhagic consolidation.

The heart showed subpericardial petechial hæmorrhages, but no gross lesion otherwise.

The thymus was normal in size and appearance; no hæmorrhages or other gross lesions, no particular enlargement of any of the regional lymph nodes.

Microscopic.—The pleura was œdematous. The lung parenchyma showed irregular wide areas of consolidation with alveoli filled with recent serosanguineous exudate. In other areas the exudate was chiefly serous. These areas bore no relation to the bronchi. Some of the bronchi contained recent extravasated red blood cells and serous material. About several of the larger blood vessels an œdematous swelling and hæmorrhagic infiltration into the surrounding tissue were noted. There were several small areas of peribronchial lymphocytic infiltration. No lesions elsewhere.

Diagnosis.—Serum reaction (accelerated), with pulmonary œdema.

COINCIDENTAL INTRA- AND EXTRA-UTERINE GESTATION

BY R. B. HARE, M.B.(TOR.), F.R.C.S.(EDIN.)

Simcoe, Ont.

Without a careful survey of the literature it would be difficult to say how rare this condition is, but I have no recollection of any published case in my reading of the current literature; hence, I believe, the following case merits publication.

Mrs. L., a white woman of 20 years, married three years, was seen by Dr. G. K. Shirton, of Waterford, January 2, 1939, at her home and gave a history of crampy pains in the lower abdomen off and on for a week, with some vaginal bleeding in the morning on rising, and then severe pain on the evening of January 1st with some slight bleeding; again on the evening of January 2nd, severe pain and slight bleeding. Her last menstrual period was November 17, 1938, and was a scant one, but she did not consider herself pregnant. She had had a child 2 years previously.

She had no fever. She was pale and the pulse was raised slightly. Dr. Shirton considered it likely a ruptured ectopic gestation, and sent her to the Norfolk General Hospital, where I saw her with him.

The patient was a pale worried looking young woman. The pulse rate was 80; abdomen not rigid but very tender in the left lower quadrant.

Vaginal examination showed the uterus to be retroverted to some extent. The cervix was closed. There was marked tenderness on moving the uterus, and its size could not be made out. No masses or bogginess could be felt in the fornices. The white cell count was 19,400, with polymorphonuclears 83 per cent. There were no urinary symptoms. The diagnosis of ruptured ectopic gestation was concurred in. Operation was advised, accepted, and carried out at once.

On opening the abdomen, about 3 pints of fluid blood and clots were found and removed. The left Fallopian tube was dark and distended with blood clot. An external tear was found in it. The right tube and both ovaries were normal. The uterus was about the size of a 2½ to 3 months' pregnancy, and presented the mottled appearance so often associated with pregnancy. The left tube was clamped and removed intact.

Pathological report from the Public Health Laboratories: "The specimen consists of a Fallopian tube measuring up to 6 cm. in length by 2 cm. in its greatest diameter, and having a rupture from which a mass of blood clot is protruding; this measures 1.8 cm. in diameter x 3.5 cm. in length and appears to consist of blood clot with thin somewhat fibrous covering. The tube is patent from the point of rupture to the fimbriated end.

"Sections of the hæmorrhagic mass from tube show a marked amount of recent hæmorrhage in which are found a few chorionic villi and syncytial cells. The syncytial cells are seen attached to the wall of the Fallopian tube, which is dilated and markedly congested and slightly œdematous. There is no evidence of embryo in either of the sections examined."

Mrs. L. was again admitted to Norfolk General Hospital, July 30, 1939, for medical induction of labour, but with no results, and went home again August 1, 1939. The fetal heart tones were strong and 148 per minute.

She was readmitted August 16, 1939, at 3.45 a.m., labour having commenced about midnight. The pains were every 2 minutes and severe. No show, and membranes apparently intact. Routine preparation was done and at 7.30 a.m., the membranes ruptured, and at 9.15 a.m. a living female infant was delivered, which weighed 8 lbs. 7 oz. and seemed a normal full-term child. The puerperium was quite normal.

Calculated from the date given for the last menstrual period, *viz.*, November 17, 1938, term should have been August 24, 1939, so that pregnancy existed at the time of the ectopic gestation and was not affected by its rupture and removal.

In regard to the initial approach to our patients: it is well to remember that they are all frightened, all apprehensive, and many of them hypersensitive. It behooves every young man to develop a finesse in dealing with these people. It takes a certain personality to succeed in any walk of life. Many have it by natural inheritance, and others may acquire it by studying the ways of successful men and by developing within themselves those characteristics which make life a success; but, unfortunately, a few never can acquire the right type of personality which is so essential to success.—Dr. Donald Guthrie, *The Diplomate*, 1940, **12**: 87.

Therapeutics and Pharmacology

OPHTHALMIC ALLERGY

By W. L. Crewson

Hamilton, Ont.

The eyes and adnexa of our patients may be the seat of reactions to allergens from the animal, vegetable and mineral kingdoms just as other tissues of the body. These allergens may come to the parts by direct contact, as from bed clothing, cosmetics, medications, from pollens, dusts and fumes; or from foods and ingested drugs; also, from insect bites, drugs and sera injected into the blood stream or under the skin; or from infective agents such as bacteria and their products of cell metabolism; lastly, from physical agents, as light, heat, x-ray, etc.

A careful history, both personal and family, will often lead us to the conclusion that, because of other allergies, this case may be of this type, and may even lead to the discovery of the causative agent directly. Other cases must be gone into very carefully, other sources of trouble excluded, and then, a complete examination must be made by a competent allergist before the trouble can be diagnosed and cured or improved.

Angioneurotic œdema is reported to be often the result of allergy.

Marginal blepharitis, both the dry and the ulcerative type, very likely is due to allergy, and quite often blamable on foods, although dust and fumes play a part in many cases.

Chalazia.—Dr. Ruedemann says that all patients returning with chalazia over a period of years should be checked for allergy.

The conjunctiva is quite commonly the seat of allergical reactions, as all hay-fever sufferers react, more or less, in this region. Also, the conjunctiva reacts quite commonly to drugs, such as atropine and eserine. All cases of *follicular conjunctivitis* must be suspected of having an allergic source if ordinary means of treatment fail. *Vernal catarrh* has come in for much investigation by various writers, who all seem to agree that these patients are very apt to be sensitive to pollens and seasonal foods. *Phlyctenular conjunctivitis* and *keratitis* are reported to be much improved by allergic treatment.

Corneal conditions with returning ulceration or interstitial opacity have been reported cured, in some cases, after treatment of their allergy.

The *uveal tract* may react to any allergens, including focal infections, which is a vast field of study still incomplete. It is difficult to determine just how and why infections in remote areas pick out particular tissues, and why one patient with an abscessed tooth develops iritis, and one, a corneal ulcer, and also to decide whether we are doing all we can when we remove the source of infection or whether we should try to desensitize the patient afterward.

Verhoeff has definitely proved that some patients are allergic to their lens proteins and, that a cataract operation where lens protein is allowed to remain in the eye, causes an endophthalmitis which can be cured by desensitization with lens protein.

Dr. Bedell, of Albany, has reported that the retina or choroid may be sensitive and the seat of allergic reactions, and others have reported cases of optic neuritis and retro-bulbar neuritis from allergic causes.

The diagnosis of an allergic agent may be found by the patch test, scratch test on the skin, and intra-dermal methods, the first two being commonly used. It must be remembered that our cases may be area-sensitive, and that, just because a patient has been in contact with a feather bed and a feather pillow and only the eyelids swell, it is not safe to say that it is not feathers, it still may be. Allergists state that skin-testing for foods is only about 50 per cent efficient, so that the exclusion method may have to be used.

ULCERATIVE STOMATITIS AND GINGIVITIS (TRENCH MOUTH)

By F. B. Bowman, V.D., M.B., F.R.C.P.(C.)

Hamilton, Ont.

The Great War had been in existence only a very short time when many men turned up at sick parades complaining of sore and bleeding mouths. Not only in France but in the camps in England these cases appeared, and soon literally thousands of men were being invalided because of ulceration of the mouth and throat, or "trench mouth". In Italy also it was common among the Italian troops.

In 1916 the writer was in command of No. 1 Canadian General Laboratory in Folkestone, and it was decided to investigate some of the more acute cases that were appearing in and around Shorncliffe camp. Up until this time many forms of treatment had been advised, but no organized study of the etiology of the disease had been instituted. Drastic caustics and acids had been painted on the gums, and mouth washes of all kinds had been used, with no benefit. Cases were seen where the ulceration had advanced until perforation of the cheek had occurred. Deaths were reported where the patient had expectorated large quantities of foul-smelling pus, and although it was presumed that these cases and those suffering with trench mouth were one and the same it had not been proved.

Smears were made from the ulcerated areas in a large number of men, and invariably large masses of intertwined spirochætes were found, accompanied by sharp-pointed and elongated fusiform bacilli. These findings exactly coin-

cided with the findings in stained smears from cases of Vincent's angina. In fact, there was no question but that "trench mouth" and Vincent's angina were the same thing. These findings were confirmed many times, and before long the disease was put in the class of contagious diseases of the army, and men suffering from it were isolated and placed in a special camp. These facts are stated to show that trench mouth was considered a very serious war disability and perhaps in the present emergency might become just as serious.

The disease is contagious and may be transferred in many ways. The use of common drinking glasses, kissing, and the passing from man to man of tobacco bags closed with a puckering string and usually fastened with the teeth, which were commonly used in the last war, were considered frequent causes of infection. It did not attack all men who were exposed to the infection, but apparently those with a pre-existing stomatitis from some cause were more prone to infection. One considered at the time that the promiscuous prescribing of "number nines", or blue pill, which contain mercury, may have caused stomatitis and left the path open for infection with Vincent's organisms.

Whatever may be the etiology, the symptoms are fairly typical. The patient complains of tender, swollen, "spongy", gums which bleed on the slightest pressure. Some ulceration is usually found even in the mildest cases, and this occurs most commonly behind the last molar teeth, and often there may be deep sloughing ulcers of one or both tonsils. When the gums are pressed pus exudes, and pus may be seen in relation to the tonsillar ulceration. The breath is foul and more or less peculiar to this disease. There is no mistaking it, and an inflamed mouth without this odour of rotten meat, as it has been described, is, I feel, not due to Vincent's organisms. Ulceration may be very extensive and is called noma, and perforation of the cheek has been seen. The infection may attack any mucous membrane, and one has seen coincident infection of the mouth and glans penis. It has been seen as an infecting agent in certain peculiar ulcerating conditions of the rectal mucosa. Where the jaws have been immobilized by wire splints in fracture of the mandible Vincent's infection always occurs and the foul breath present is characteristic.

In all cases the diagnosis may be confirmed by making smears from the pus and staining with gentian violet. Conglomerating masses of spirochætes may be seen, accompanied by large numbers of typical fusiform bacilli. Frequently, one receives laboratory reports, "positive for Vincent's". This is of little use in diagnosis, and nearly every mouth when smeared will show the presence of spirochætes. There must be large numbers of them; in fact, they with the fusiform bacilli, should dominate the microscopic field. The clinical appearance must be combined with the laboratory findings to make a positive diagnosis. The mere finding of a few spirochætes and fusiform bacilli does not justify a diagnosis of trench mouth.

In the army when these patients first began to present themselves they were labelled pyorrhœa. Workers in studying pyorrhœa in other fields had reported the presence of a peculiar motile amœba and had even definitely stated that this was the cause of this disease. They advised treatment with ipecacuanha or one of its derivatives. Although we were familiar with the smears from the gums showing large numbers of spirochætes in these patients, yet the possibility of the amœba being the cause behind the whole condition could not be discounted entirely. It was decided to prepare a mixture of ipecac and arsenic, and apply this to infected areas. Liquor arsenicalis, vinum ipecacuanhæ and glycerin were mixed in equal parts. It was astonishing to observe the rapidity of the disappearance of the foul breath, the sore and bleeding gums, the ulcers, and the generally inflamed appearance of the mucous membrane of the mouth. We were so impressed with the remarkable results obtained that where no improvement was noted the case was not labelled trench mouth. Whether the ipecac has any specific effect is questionable, and it may have only a local tonic and astringent action on the condition. We advised the use of the solution on the tooth brush and on cotton applicators. Since this work was published the use of intravenous arsenicals combined with the above mixture is recommended.

SUMMARY

1. Trench mouth may be a problem among the troops in the present emergency.

2. Trench mouth is a medical disease and should be diagnosed by the physician and treated by the dentist only under his direction.

3. The diagnosis should be made microscopically only when the Vincent's organisms dominate the field and can be correlated with typical clinical symptoms.

4. A mixture of equal parts of wine of ipecac, liquor arsenicalis, and glycerin is still the best remedy for local treatment.

5. Intravenous injections of small doses of one of the arsenicals should be used in severe cases.

6. The use of an atomized spray of the above solution gives excellent results in the treatment of the stomatitis and foul breath always present in patients with immobilized jaws following fracture.

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3. *Ibid.*: Ulcero-membranous stomatitis and gingivitis among troops; its cause and treatment (preliminary report), *Proc. Roy. Soc. Med.*, 1915-16, 9: 51, Med. Sect.

Clinical and Laboratory Notes

BLEEDING AFTER CIRCUMCISION

BY S. GOLD, M.D.

Montreal

Bleeding resulting from the accidental cutting of the glans penis is a rare complication, but often very difficult to treat. Great care is usually taken to avoid this type of accident by allowing ample space between the cut edge of the prepuce and the glans or by cutting in front of the clamp, and, mainly, by carefully separating the adhesions between the glans and the prepuce. However, owing to faulty technique or some anatomical anomaly one does occasionally meet with this type of accident. In the past ten years I had occasion to treat a few cases of this type.

The usual methods of controlling the mild surface wound bleeding, such as one finds occasionally after the forceful separation of preputial adhesions, were here of no avail, as in all cases too big a slice had been taken out of the glans and the bleeding could not be controlled satisfactorily by pressure, styptics, or hot applications. The histological nature of the tissue of the glans, which is made up mainly of tortuous veins with relatively little connective-tissue cells and elastic fibres, prohibited the application of clamps, sutures or ligatures, as these would only start new bleeding points by cutting through the soft vascular tissue of the glans. To avoid a further loss of blood, I decided to resort to a more radical method to control the bleeding, based on the principle of acupressure, and found it, under the circumstances, to give satisfactory results.

The details are important. After the glans has been painted with a mild non-irritating antiseptic solution, a sterilized medium-sized, straight sewing-needle is passed beneath the surface of the wound about 1 mm. deep, parallel to the corona glandis. In order to accomplish this satisfactorily 1 mm. or more of the healthy surface is included in the bite on both sides of the needle ends. The convex nature of the glans makes this procedure quite simple. Although there is little chance for the needle to come too close to the urethra or fossa navicularis yet this possibility must be kept in mind. Cotton thread of medium thickness, dry and sterile, is wound around the needle a few times in a circular fashion, and then in a figure-of-eight fashion, enough tension being applied to compress the wound sufficiently from side to side in the form of a pinch to stop the bleeding. The mere presence of the needle in the tissue helps to check the bleeding owing to the increased tension there. The constricting effect produced by winding the thread around the needle as well as the partial covering of the wound obtained by it, accomplishes the rest.

Dry, non-waxed cotton thread is more suitable for this purpose than silk or catgut. Silk tends to cut the soft tissue too easily, whilst catgut, due to the ease with which it changes its consistency, cannot be relied upon. Catgut either dries too much, hardens and becomes irritating, or swells and eventually becomes slack by absorption of moisture. In favour of dry non-waxed cotton thread may also be mentioned the fact that its coagulating effect on the blood is greater than that of silk or catgut.

The sharp point of the needle may now be broken off by steadying the protruding end with a firm forceps or needle holder and breaking the point off with another forceps. A dry dressing is applied and left on for six hours or so, after which it is removed and a liberal amount of borated vaseline smeared all over the glans to protect the wound against contamination with urine. Any other mild antiseptic ointment may be used instead of the borated vaseline. On removing this dressing, the needle, black from oxidation, is found lying freely in the dressing. The wound does not now present any unusual features, and may be treated in the same manner as any other healing surface wound, except for the special care that is to be taken in removing an adherent dressing. A liberal soaking with hydrogen peroxide, gentleness and patience, will facilitate its removal.

The ventral side of the corona glandis, although more commonly cut accidentally than is the glans proper, does not present so difficult a problem as does the glans proper, the position and shape of the corona glandis making manipulation less difficult.

A healed scar over the ventral side of the corona is not an uncommon finding in adult life, giving evidence of a healed cut. The too oblique application of the clamp on the prepuce, as well as an adhesion which may be easily missed there, will account for it. However when difficulties are encountered one may resort to the method suggested, and save an unnecessary loss of blood.

Editorials

CANADIAN WHEAT, FLOUR AND BREAD

WHEAT is of particular interest to Canadians because Canadian wheat ranks as the best in the world and is our greatest farm crop. Nutritionally, as pointed out by McCollum and Simmonds,[1] "No cereal grain has been yet studied which contains proteins superior to those of wheat, and its prominent place in the diet of mankind is justified by the results of experiments on animals."

For human consumption the greater proportion of wheat is converted into flour. Over 90 per cent of all the flour used in Canada is household patent white flour and baker's white flour, types first produced commercially only 60 years ago. These white flours furnish almost one-quarter of all the calories consumed by Canadians.

A study of the figures published by the Mixed Committee of the League of Nations[2] shows that white flour consumption in many countries of the world has decreased during the past thirty years. This decrease is obviously of great economic importance to Canadians. Why has it occurred? There are a number of reasons. One is the higher standard of living. With improved storage and transportation of perishable foods, the more attractive vegetables and fruits are much more extensively used now than formerly. Another reason, however, is that more and more, with our ever increasing knowledge of nutrition, our white flour products have been shown to be deficient in many of the vitamin and mineral elements essential for health, and even life itself. It can truthfully be said that the medical profession, by and large, no longer regards our white bread as "the staff of life" but simply as the cheapest source of energy for our people. This is indeed a tragedy from a nutritional standpoint, since our Canadian wheat is so richly endowed with these essential food elements.

Canadian wheat is an excellent source of many of the members of the vitamin B complex. There are no less than eight members of this B group, four of which have already been shown to be essential for human nutrition, namely, thiamin (B_1), riboflavin (B_2), nicotinic acid, and pyridoxin (B_6). More attention has been directed to thiamin (B_1) than to any of the others by scientific investigators. Studies have shown that our Canadian diet tends to be deficient in this vitamin.[3] However, further work may demonstrate that some of these other B vitamins are just as important as vitamin B_1 from the standpoint of the national dietary.

The thiamin (B_1) content of Canadian wheat varies from 535 international units per pound to 670 units. The present hard spring wheat averages 650 units. In contrast to this the average vitamin B_1 value of household white flour is 95 units per pound, or only one-sixth of the amount originally present in the wheat berry. Bakers' white flour contains 150 units per pound, or less than one-quarter of the original content.

Our Canadian white bread contains 75 to 95 units of vitamin B_1 per pound. A loaf of bread made from whole wheat flour as the sole source of flour contains between 375 and 400 units of vitamin B_1 per pound. A loaf of this character made entirely out of whole wheat is heavy and meets with the approval of comparatively few Canadians. It is obvious that our people prefer white bread.

In what way can the valuable wheat vitamins and minerals be captured in a white loaf of bread acceptable to the consuming public? In Great Britain it is planned to produce vitamin B_1 synthetically and add it to white flour. Unfortunately,

1. McCOLLUM, E. V. AND SIMMONDS, N.: The Newer Knowledge of Nutrition, 3rd ed., Macmillan & Company, New York, 1925, p. 129.

2. Final Report of the Mixed Committee of the League of Nations on "The Relation of Nutrition to Health, Agriculture and Economic Policy," Official No. A. 13, 1937, II. A, p. 103.

3. McHENRY, E. W.: Observations on the nutritive value of bread, *Canad. Pub. Health J.*, 1940, **31**: 428.

it is impossible at this time to add all the members of the vitamin B complex because they are not available in synthetic form. It does seem, however, that when our Canadian wheat is so rich in all these factors steps should be taken to retain them in the milling process rather than to add them synthetically. If possible, retention in the milling process of any major portion of the natural wheat vitamins would appear to be preferable to any synthetic addition.

FREDERICK F. TISDALL.

ORTHOPTICS AND ORTHOPTISTS

THE value of orthoptics, a form of treatment by remedial exercises designed for the purpose of removing concomitant squint and establishing correct stereoscopic vision, is, of course, well recognized by ophthalmologists everywhere. It is not so well appreciated, naturally, by other medical practitioners who have not acquired the requisite special knowledge. The principle of movement as applied by Stutterheim to the cure of eyestrain in which squint is not a feature is one of the later developments of the subject. Javal may be regarded as the founder of modern orthoptics, since he was the first to use the stereoscope to counteract the suppression that so often occurs in squinting, thus awakening diplopia (Manuel du Strabisme, 1863). Worth's ambyloscope (1903), designed on the principle of the stereoscope, and later modified in various ways, is the most valuable instrument at the present time for diagnosis and training. As time went on the subject has attracted more and more attention. The special journals have been taking it up, and several books have been written about it, chief among which are Miss M. A. Pugh's "Squint Training" (Oxford University Press, Humphrey Milford, London, 1936) and N. A. Stutterheim's "Eyestrain and Convergence" (H. K. Lewis, London, 1937). A special journal has recently been wholly devoted to the subject (*The British Orthoptic Journal*, 1939).

Miss Pugh's statistics are convincing that orthoptic training is of great value in the correction of squint, but one gathers that great circumspection is required for the proper selection of cases and the prescription of suitable treatment. By orthoptic measures alone, under optimum conditions, approximately 40 per cent of patients with true projection may be expected to respond successfully to treatment. In some of the more complicated cases refraction, occlusion, operation, and orthoptic exercises need to be combined.

It follows from this that the practice of orthoptics calls for wide and special knowledge, patience, sympathy, a deep insight into character, and, moreover, a special technical aptitude. It is so time-consuming also that it is hardly to be expected that the busy specialist will concern himself with it, further than to outline the procedure and check the case from time to time. It is probable that this line of work will be more and more relegated to the specially trained technician.

It would seem certain, too, that this technician, he or she, preferably she, should be well educated, bright-minded, patient, and faithful, faithful to both doctor and patient. As most of the patients requiring orthoptic treatment are young children they have to be persuaded, entertained, interested and cajoled, and a woman can usually do this better than a man.

Some advance has been made in Britain. Orthoptists are now on the National Register of Medical Auxiliary Services. This register contains 59 names, of which 10 are in London, 4 in Scotland, 2 in Wales, 1 in Northern Ireland, and 1 in Canada. Most of the work is done by women who have taken a one-year course in elementary optics, the anatomy and physiology of the extra-ocular muscles, refractive errors, and strabismus. The practical work consists of methods of investigation, therapeutics, and lectures in hospital procedure and medical etiquette. The inclusion of the last mentioned subject may occasion some surprise, but it is a wise provision. The practice of orthoptics lends itself pre-eminently to charlatanism. The average person does not understand what is required, the apparatus is impressive, and the treatment is often prolonged. Only those who are properly trained should be

permitted to practise this specialty; it is not a matter for the optician. Then, again, the technician should keep in close touch with the referring oculist, carrying out the latter's instructions to the letter, and reporting progress at reasonable intervals. Under no circumstances should the technician attempt to carry the treatment to a conclusion without more expert advice. In some cases time, effort and money may be wasted.

How many orthoptists are needed in a given community has still to be worked out. It would seem desirable that an orthoptic department should be established in every eye-hospital and in every large general hospital which has an eye-department. Probably, too, in a large town or city a private practice could be built up. Most people would like to rid their children of a squint.

A.G.N.

Editorial Comments

Interns Who "Jump" Contracts

During the last few weeks a number of complaints have been received at the Canadian Medical Association respecting interns who have jumped their contracts—in some instances without giving the hospital authorities the slightest warning that they were taking such a step. In almost all of these cases the interns had signed contracts with their respective hospitals agreeing to give faithful service for a period of twelve months. The action of these university men in breaking these contracts has been grossly unfair to the medical staff of the hospital, to the patients, to their fellow interns who must carry a heavier load, to the hospital administrator, and to the Canadian Intern Board who have jointly arranged these internships.

A very serious angle to this matter was presented by the fact that very recently two large American hospitals have vigorously protested the actions of Canadian medical graduates who had received appointments, had signed contracts, and then broke these contracts without valid reason. One administrator stated very frankly that if this continued the opportunities for internships by Canadians in American hospitals would be cut off. While we hope that the opportunities for the great number of conscientious interns would not be jeopardized by the actions of the few who are inconsiderate, we also think that interns from Canada are not any more liable to ignore contracts than those from other countries. It must be realized, however, that a reputation abroad for unreliability would ultimately cut off some of the finest opportunities now available for intern experience.

It so happens that the increasing shortage of interns is making it possible for interns who do not think they are getting sufficient use of the scalpel, or other opportunities of doubtful value, to readily find openings in other hospitals. There is reason to believe that some hospitals, desiring to fill their quota of interns, accept applications in mid-term without sufficiently checking the explanation given by the applicant for being free at a time of year when most recent graduates are busily engaged with their internships. In at least one instance the intern committee authorized the superintendent to engage one such applicant despite a dubious background.

This situation must be cleaned up effectively or the whole system of internship, except where it is controlled by the medical college, will be broken down. Would-be interns should not sign contracts unless they are sure that the hospital is known to give good internships. Hospitals should not accept applicants to fill vacancies in mid-season without thorough investigation of the intern's movements since graduation; unless the reasons obtained thoroughly justify the intern's action, he should not be engaged, no matter how urgent the need for more interns. If an honorarium be paid, a portion of this should be withheld until the termination of the contract to ensure satisfactory completion of the contract.

The situation will be considerably clarified when the various provincial licensing bodies demand that the applicants give evidence of having completed a satisfactory intern year before the licence to practise be granted. Without such requirements the province has no adequate control over the situation. Meanwhile interns who value their contractual relations so lightly, and who are so obviously unfair to the medical staffs and the patients of their hospitals, should realize that notation of such actions is on record in the files of both the Canadian Medical Association and the American Medical Association.

At the present time a Canadian intern who has been offered an excellent position in a large American city is having a most difficult time to satisfy the state requirement of a full year of internship in an approved hospital because he broke his contract in a large Canadian hospital eleven days before the completion of his twelve months' appointment.

HARVEY AGNEW

Special Article

THE TRAINING OF THE YOUNG PATHOLOGIST*

BY JAMES MILLER

Kingston, Ont.

We who are graduates in medicine are particularly fortunate in our choice of a profession because of the many alternatives which it offers at the outset of a career. Other professions tie you to an office stool or set you on some other well defined track which must be followed to the end. As Robert Louis Stevenson says of the man starting off on a walking tour, "Such an one has not surrendered his will and contracted for the next hundred miles, like a man on a railway. He may change his mind at every finger post, and, where ways meet, follow vague preferences freely and go the low road or the high, choose the shadows or the sunshine, suffer himself to be tempted by the lane that turns immediately into the woods, or the broad road that lies open before him into the distance, and shows him the far-off spires of some city, or a range of mountain tops, or a rim of the sea, perhaps, along a low horizon. In short, he may gratify his every whim and fancy, without a pang of reproving conscience or the least jostle of his self-respect." So it is with the young medico.

One of the most attractive and important of all these various roads which open out before the young medical man is pathology. For its attractiveness we can all vouch; as to its importance, it is not too much to say that it is the linch-pin which holds together the entire work of the hospital and the medical school. It is advisable, however, that the graduate who undertakes to specialize in pathological work should have an inclination towards it. He should be specially adapted for it and should have such preliminary experience that he can decide whether or no he would wish to make it his life work.

Laboratory work has certain advantages over general practice and the clinical specialties. The hours are more or less defined, although, of course, the devotee should be prepared for any amount of overtime. There is, perhaps, as little night work in connection with it as in any other form of medical practice. There is not the same amount of wearing responsibility for human lives as is associated with most of the branches of medicine. At the same time, no man should take it up merely because it presents these advantages. There is a type of mentality which fits a man for the rather monotonous routine of staining sections and peering into the microscope to wrest their secrets from the cells and micro-organisms, just as there is a type of mentality which regards all pathological procedures as finicking and unnecessarily time-consuming when compared with the contacts with humanity in illness. It is well that the medical student, during his course of study, should have sufficient experience of this type of work to determine his fitness or otherwise for it. Hence the advisability of appointing undergraduate demonstrators and summer assistants. During the last twenty years it has been my custom to ask for ten or more volunteers from each fourth year as they come up to the study of pathology for the purpose of the ordinary laboratory routine, and to select from among them one of the best for a summer post in which he is asked to undertake some simple research. No inconsiderable number of these volunteer students have subsequently taken up pathology as their life work.

Like the man on the walking tour there is no necessity for our tyro to stick permanently to laboratory procedure. He can wander off on one of the bypaths or resume the main road. No harm is done if after an experience of a year or two, he returns to clinical work. Indeed, it is from the ranks of these partially trained pathologists that the best of our clinicians — surgeons, internists, gynæcologists —come. A man whose post-graduate training commences with laboratory work always makes the better clinician for this experience. The names of William Osler, David Wilkie, J. W. Ballantyne, and many others spring to one's mind as specialists who have enriched the science of medicine just because they were primarily laboratory men. Nor does a preliminary experience in clinical work unfit a man for pathology. Indeed up to a certain point the greater that clinical experience the better. This change from clinical work to the laboratory side of things is much rarer than the reverse process, but I have known good pathologists who came from the ranks of clinical workers, including general practitioners. Such transition may be due to the realization that the practitioner is better suited for the laboratory type of work, or it may be due, as in some instances which arise to my mind, to illness and partial disablement such as the onset of deafness. Far be it from me to suggest that the ranks of pathologists should be recruited from the "stickit" clinicians, but such

* The Presidential Address delivered before the Ontario Association of Pathologists, Kingston, September 21, 1940.

men have done and are doing excellent work in their chosen field.

This brings me to the point that some clinical experience is of great value to the pathologist in all branches of his work. Indeed, it may be laid down as axiomatic that an internship is a necessary preliminary training. It may be asked what type of clinical work this should be, what branch of medicine it should cover. As a matter of fact, it does not greatly matter. Perhaps a rotating internship in a large general hospital is the best, but I am not quite sure, because I am no great admirer of the rotating internship either from the point of view of the intern himself, the patient, or the chief. Before he is of much use to the senior in charge of wards he is off to some other specialty. In our conditions for membership for the Ontario Association of Pathologists we suggest a period of clinical work, but, quite wisely I think, we do not stipulate what it should be nor do we regard it as an absolute *sine qua non*.

My own clinical experience was gained during six months' residence in the medical side of the Royal Infirmary of Edinburgh under Dr. Alex. James, an experience which I would not have been without. In addition, I had a year in South Africa with the Edinburgh South African War Hospital, when I had a varied experience with some surgery, a good deal of typhoid fever diagnosis and treatment, such laboratory work as the hospital undertook, including post-mortems, the x-ray work of the hospital (at that time rather primitive), and, last but not least, general practice in the native location at Norval's Pont on the Orange River. I can remember to this day doing a Syme's amputation on a native who developed bilateral gangrene of the feet following typhoid, my colleague Dr. George Chiene performing a similar office coincidently to the other lower limb. The patient recovered without turning a hair.

The next question which arises is: what should the graduate know of his subject before he ventures to attach the title pathologist to his name? During the forty years I have been in medicine the subject of pathology has enormously expanded. We may still provisionally divide it under the following three headings, namely: (1) morbid anatomy and histology, medical and surgical; (2) clinical pathology, including blood histology and the chemistry of urine, blood and body fluids; (3) bacteriology and serology. So specialized has the work become in all three departments that it is exceedingly difficult for one man to master the necessary details of all three branches. Thus specialization within the pathological field becomes not merely advisable but necessary for those who would reach the higher ranks. At the same time there is undoubtedly a tendency, which we who are seniors in the profession detect, to over-specialization. A man cannot be a good pathologist unless he knows something of every department as well as everything in his own selected field. My old friend and teacher, Robert Muir, was accustomed to stress this point and he is himself a fine example of a pathologist with a broad foundation of knowledge, as is evidenced by his writings. It is undoubtedly necessary that we should have men who have made a special study of one particular department, and we further permit and encourage those who make themselves authorities in a narrow field. It is by these super-specialists that the major advances along a particular line are made, but the broad-based foundation is necessary if we are to have a properly balanced vision. Professor Topley, the co-author of the well known treatise on bacteriology in a recent address entitled "The Place of Pathology among the Medical Sciences" — an address which I strongly advise you all to read—has put the matter well. He says: "I do not think it is good that the young pathologist in his twenties should be labelled a morbid anatomist, a bacteriologist, or a pathological chemist, and run in blinkers from that day onwards." "The medical bacteriologist", he continues, "is a pathologist who is concerned with bacterial and virus infections in man and animals. He must spend much of his time and energy in studying the parasites; but he cannot neglect the hosts." Walter B. Cannon, in a tribute to S. B. Wolbach, of Harvard, in the July number of the *Archives of Pathology* talks of the "binocular insight into the nature of transmitted diseases" which the "oscillation between duties" to both pathology and bacteriology gives the investigator. Of this binocular insight Wolbach is an outstanding example.

Thus the young graduate who wishes to fit himself for the post of pathologist to a hospital must have at least two years' special experience, and this is the period laid down by our Association as the necessary preliminary to membership. This time of apprenticeship must be distributed judiciously amongst the three branches of the work. For some years now, in my own department, I have offered what, in my experience, is the necessary minimum of training. In the first place, one year in clinical pathology, chemistry and bacteriology in close touch with the wards of the hospital. This fellowship in clinical pathology was established many years ago through the generosity of the late Mrs. Henry Richardson. The second year is devoted to surgical pathology and post-mortems. At the end of these two years the graduate should be well qualified to undertake the work of pathologist to one of the local provincial hospitals. It must be clearly understood, however, that this is the minimum experience required, and that periods of more intensive training are advisable, in one of the larger centres where the material is more varied.

The crying need of the present time is more pathologists. It is not desirable that all the work should be concentrated in the larger centres, with the smaller hospitals sending in their material by mail and receiving a report the next day or at some subsequent date. More and more is it necessary that cities having one or more modern hospitals within their boundaries should have their own pathologists, with well equipped laboratories staffed with technicians. It is perhaps unnecessary to say that the governing boards and the medical staffs are fully alive to this need. We are glad to know that the young pathologists are here, waiting or in the process of training; the fundamental difficulty is one of finance. Several factors mitigate the financial stringency. Hospitals with proper scientific facilities receive a higher grading from bodies such as the American College of Surgeons than those without them, and they should in consequence be prepared to pay for it. The government have helped in the past by insisting upon the examination of certain material removed at operation, and the sums obtained in this way from the patient may reasonably be applied to the salary of the pathologist. Were the government to give additional grants to institutions supplied to their satisfaction with scientific staffs the situation would be still further eased. This is an advance which may come at no distant date.

What is a reasonable salary for a young man starting out with the training which we have stipulated? My impression is that in the post-war period we shall all have to be satisfied with smaller incomes and salaries, but that is neither here nor there for the present. I should like to suggest that the pathologist who is scientifically minded should not be too grasping in this matter. He should regard the pleasing routine of his deliberately selected specialty as in some sense an offset against the relatively low remuneration attached. The past has small significance in this respect, since the cost of living has steadily risen and will undoubtedly rise still farther, but I should like to cite an example of a devotee of science who paid little attention to monetary returns so long as there was enough—Carl Weigert, the man who discovered the method of staining the myelin sheath of the nerve fibre, the elastic tissue and fibrin stains, and almost succeeded with neuroglia, and whose name is associated with many pathological processes and theories. To my certain knowledge (and I spent six months with him in the Senckenberg Institute in Frankfurt, Germany), he never at any time had more than 1,500 dollars a year. He had the title of *geheimer Medizinalrat* and he was world-famous, but his wants were few and he loved his work. Need I mention that present-day Germany would have thrown him out with contumely, for he was a Jew?

But, as everyone will admit, the labourer is worthy of his hire and pathology ranks with the most important specialties in medicine. Although we should not have to bribe our young graduates to take it up, when they do so they should receive a living wage. We may provisionally fix this minimum living wage at 3,000 dollars per annum. This yearly sum should be assured to the young aspirant who has already spent at least nine years in fitting himself for the job. There should, however, be opportunities for adding to and supplementing this minimum sum. I definitely deprecate, as I feel sure you all do, the polyvalent type of pathologist, the man who combines x-ray work or anæsthetics with his laboratory duties. But there are certain legitimate and obvious additions to his routine which his clinical colleagues would be glad to hand on to him because of their laboratory aspects and which would add materially to his income, such as cases of blood diseases, diabetes and allergy in its various aspects. In this way our provincial hospital pathologists may hope to enlarge their incomes as the confidence of the local profession in them increases.

There is another way in which it may be found possible to obtain the necessary funds to establish a pathologist in an area and that is by a group of hospitals in different towns—say three of them—combining to pay a reasonable salary. The pathologist, establishing headquarters in one of the towns, visits the others once or twice a week. This method of financing a laboratory specialist is not so good as the other. To get full benefit from a pathologist he should always be on the spot. Too much and too constant movement from one place to another is good neither for the soul nor the body. Still, where the places concerned are sufficiently near to one another, it is an obvious method of meeting the difficulty.

The function of the pathologist is quite definitely to assist his clinical colleagues with their cases. He is the helot of the hospital unit, the hewer of wood and the drawer of water. He has to assume a lackey's position even to the most junior of his clinical colleagues and to take their orders and instructions. He, however, gets a little of his own back in what one of my colleagues has called the "Temple of Truth"—the autopsy room. There he reigns supreme, and even the most senior of the staff enters its portals with due humility and gives his pre-autopsy diagnosis with fear and trembling.

This service to the clinical staff has to be given at all hours. The pathologist has no overtime. Unless he has a fully qualified assistant there is little of this Wednesday afternoon golf for him, and even Saturdays and Sundays are not his own. Indeed his work has a way of concentrating upon universal holidays such as Christmas day. I can vividly recall Yuletides spent in carrying out post-mortems with

the attendants absent of course and the pathologist having on these occasions himself to perform the toilet of the body.

This leads me to say that he who would tread the paths of the hospital pathologist must be capable of carrying out all the various technical minutiæ himself. I see signs, alas, among the rising generation of delegating all offices of the kind to the technical staff. If there is a piece of research to perform he is too lordly to put his shoulder to the wheel until the sections are ready for the microscope. He issues his instructions to duly qualified technical workers, and troubles himself little with the finer details of section cutting and staining. I can fancy the scorn with which some of my teachers would have dealt with such delinquents. I have no hesitation in saying that the true pathologist must make himself skilled in all the various procedures which come under his jurisdiction. At any time he may be without the technician, who quite properly relieves him of much of his comparatively unskilled work, and he must be capable of making a good job of the procedure demanded, whatever that may be. Like many of you I learned in a hard school. Forty years ago technicians were rare. We all had to embed our own tissues, cut and stain our sections for all purposes and by many methods. I cannot recall sweeping out the laboratory, as one of my teachers claimed to have done after he had reached the rank of a full professor, but I am not sorry for a hard and varied training in all the branches of the work.

One characteristic the pathologist must have and that is abundant tact. It is part of his duty to train and teach his surgical and medical colleagues. It is sometimes a heart-breaking business. With the seniors it may be impossible, but he can do something with the younger men, especially if they are his former pupils. He must insist upon the proper filling in of the various items in the data sheets which accompany the specimens to the laboratory. Some of the more high and mighty laboratories, I am told, actually refuse a report if clinical and other details are insufficient. I must confess that my courage fails me here, but I constantly rub in this dictum, that the more details he puts into his data forms the more help he will get from me. The pathologist very soon classifies his clinical colleagues, did they but know it, according to their efficiency in this respect. And it is a reasonable classification. The clinician whose mental process is: "Here is a specimen; make what you can of it; I am not going to prejudice you with clinical facts which may give you a clue; I want an unbiased judgment and there must be no shilly shallying": such a clinician is the lowest of his species and he is not apocryphal. The all-time lowest in my fairly extensive experience was a general practitioner who returned a blood for a Widal test with these words written across the data sheet—"Mind your own business". The better class man will trust his pathologist to be frank. He knows his own limitations and is not ashamed of admitting mistakes—which at some time or other everyone makes—and of acknowledging ignorance when he meets something outside his own experience. Read the lives of the great physicians and surgeons, such as Osler, Lister, James Mackenzie, Simpson, and learn from them that the greater the man, the more honest he is in admitting his errors and ignorance and the kindlier he is to the failings of the sincere and hard-working colleague.

Another way in which the pathologist can stimulate his clinical colleagues to higher things is by enlisting their personal interest in their specimens. This of course particularly applies to the surgeons. What a difference it makes to a report upon a tissue when the surgeon and the pathologist co-operate in the gross description and the removal of the pieces intended for microscopic examination! The clinician himself should be aware of the fact that co-operation of this kind up to and including the microscopic diagnosis places him in the higher ranks of his specialty. In this, as in no other way, he is enabled to keep abreast of advances in his subject and to control his own results.

One of the first things the pathologist should attempt, on taking over the direction of a hospital laboratory, is to do all he can to stimulate and improve staff meetings and conferences. At these gatherings he should produce his gross specimens and microscopic slides as the cases come up for review. He should familiarize himself for this purpose with the latest methods of photography and microprojection. He must remember that, although the senior members of the staff may be bored with such things, the recent graduates are quite capable of appreciating them, and they should not be allowed to lose interest in matters more purely scientific. A further point in this relation is that no large hospital should be without its museum. It is not necessary that many routine specimens should be mounted permanently, but a certain number should be retained for teaching nurses, and all rare material must be kept in such condition that it can be recorded if required.

Keep up your reading of general medical literature as well as of your own subject journals. This will help you greatly in your dealings with your clinical colleagues. It is more your business than that of anyone else to discourage them from wholesale laboratory demands which waste your time and are intended merely to impress the patient or his friends; it is your duty also to deviate them from improper surgical procedures, such as the removal of tubes for gonococcal salpingitis in the acute stage. It may not be possible to deal directly with a delinquent over a particular case,

but at some staff meeting the matter may be brought up and the unfortunate sequelæ of such operations—cellulitis, joint trouble, endometriosis—may be emphasized, and the perpetrator pilloried in his own conscience. Remember, however, that such action can be taken only when the pathologist himself is thoroughly familiar with the whole ground, and that means careful reading in journals other than pathological ones.

One point more. The pathologist will not have been long at his job before he is faced with two alternatives which are almost in opposition to each other, namely, the clearing off of his reports as each day ends and the devoting to the individual and more important matters that amount of extra time which their nature demands. The former must of necessity be done if he is not to fall hopelessly behindhand with his work. As technicians and student help become available much of the routine work can be delegated, but the pathologist must remember that he is responsible for the whole of the work done in his laboratory, and he must be very sure of the reliability of his men before he signs reports for which they have done the diagnostic work. As to the individual items which he personally superintends, that is a matter for each man to decide, but let me say this that smears from cases of Neisserian infection and sputum from pneumonias and cases of pulmonary tuberculosis are among the most important and difficult of his duties and can be delegated only to those with great experience.

There remains the matter of research, about which I have time to say only a few words. The worker in the hospital laboratory can be a researcher if time and opportunity permit, just as good a researcher as anyone else. Indeed a considerable part of his routine *is* research of no mean order, and research problems frequently arise from routine investigation. A case of some rare disease adequately recorded advances our knowledge, if only by a step. In the past many cases of this kind occurring in the smaller hospitals have been lost to us through lack of time and stimulus from the clinical staff and lack of the pathologist on the spot to apply the incentive for publication. Moreover, in his spare time the pathologist with ideas of his own and with the assistance and advice of specialists in the larger centres can do as good work along certain lines as anyone else. That is one of the reasons for the existence of an association such as ours. We invite the presentation not only of cases but also of ideas and results founded upon honest investigation on the part of all our members.

What I have said up to the present has been concerned chiefly with the training and functions of the hospital pathologist. Let me close by saying a few words about the man who wishes to become a teacher and scientific worker in one of the larger centres. The main difference between the two types of pathologist is that in the case of the latter the period of training must be considerably longer and should be definitely on research lines. While there is a difference in the methods of training it should be clearly understood that, as Topley puts it in the above-mentioned address, most pathological investigators are the better for a period spent in diagnostic work.

Forty years ago it was customary for the intending professor to go to the continent of Europe for his post-graduate training. This was due partly to the fact that the best research work was being done in Germany and France, partly to the advisability of acquiring at least a reading knowledge of foreign tongues. Now, and for some time to come, not only is it impossible for aspiring researchers to go abroad and make the grand tour, but for many years there has been, owing to the appearance of a strange type of mentality, a loss of culture and idealism in Germany and neighbouring countries. This tendency for central Europe to lose its dominance as a post-graduate school was manifesting itself even before the first Great War. I remember well that when I returned to Germany in 1904 my old teacher, Carl Weigert, said to me "You Britishers have been coming to us for your research stimulus. In ten years' time we shall all be crossing the Atlantic". Doubtless at the time he made this remark Weigert had in mind only the progressive increase of research facilities in the United States, not any deterioration of science in his own country. For the last twenty-five years both these factors have been operative. Undoubtedly war-torn Europe is no place for the more placid life which breeds ideas and produces great scientific results. The Western Hemisphere will increasingly become the home of research workers of all types, partly from this cause and partly for financial reasons.

The pathologist who aims at the higher walks in his profession must, then, select some school where a master in the craft who has built up a department invites earnest students to learn his methods and develop independent and accurate minds under his guidance. Such schools and such masters are to be found in ever increasing abundance in the Western Hemisphere, and Canada is taking and will more and more take an honourable part in this the highest form of scientific work.

In the foregoing I have restricted myself mainly to the training of the hospital pathologist. The pathologist in Public Health is almost a theme by itself, with the emphasis laid upon bacteriology and serology and the prevention rather than the diagnosis of disease. But we as an association are chiefly interested in pathology in direct connection with humanity in illness, hence my admittedly partial treatment of the subject.

Men and Books

SHAKESPEARE'S SON-IN-LAW: DOCTOR JOHN HALL*

BY E. P. SCARLETT

Calgary

"Well your Majesty, is not this world a catholic kind of place? The Puritan gospel and Shakespeare's plays; such a pair of facts I have rarely seen saved out of one chimerical generation."

(Carlyle: *Historical Sketches*)

I.

On the morning of November 17, 1614, in a narrow London street hard by St. Paul's, three men might have been seen engaged in close conversation. All three are fellow-townsmen of Stratford-on-Avon, for the moment on business in London. The most animated of the group is Thomas Greene, the town clerk of Stratford, who is discussing the proposed enclosure of certain lands of Welcombe adjacent to Stratford. He is addressing himself principally to a bearded man of pleasant aspect with the bearing and appearance of a Londoner, whom he calls "Cousin Shakespeare". The third member of the party, younger, rather solemn, and with something of a professional air about him, is Mr. Hall, the Stratford physician. After much talk the three men apparently agree that the land enclosure will be carried out without much difficulty. The business concluded, Greene goes on his way to the Temple, and Shakespeare, who is visiting his old haunts accompanied by his son-in-law, John Hall, walks down to the smelly stairs of Blackfriars and takes boat across the Thames to Bankside, to visit the theatre and his actor friends.

The following evening at his inn Greene in methodical legal fashion sets down a memorandum of the interview, adding that they mean "in Aprill to servey the Land", not imagining the storm of protest which the scheme will eventually create. And, of course, Shakespeare, one of the leading citizens of Stratford-town and a good man of business, has already had his interest in the affair safeguarded by agreement, and takes no further interest in the matter. Neither man, nor sober John Hall, even dreams that in this account of a squabble over what later generations please to call a real-estate deal, posterity will find the only contemporary record of the personal association of William Shakespeare and Doctor John Hall, the husband of his elder daughter Susanna. Nor do they suspect that devouring time will somehow overlook this same bit of paper, to record one of the few scraps of evidence concerning the way in which William Shakespeare kept in touch with London after his retirement to his native Stratford, where his final years were spent, according to Rowe, "as all men of good sense will wish theirs may be, in ease, retirement, and the conversation of his friends."

As Carlyle remarked, it is one of the strange ironies of history that from practically one generation should have emerged the Puritan gospel and Shakespeare's plays. The parallel singular circumstance is to be found in the family association between the Puritan Doctor Hall and the actor-dramatist Shakespeare. Hall is one of the lesser ghosts of history, and he has escaped oblivion only because of his connection with Shakespeare. It is an interesting pastime, therefore, to reconstruct the life of this Warwickshire physician, not only because of the light which such a history throws upon the medicine of the time but because in the person of Hall we have a link with the family circle of Shakespeare. Here is the man who for more than six years saw and talked with Shakespeare daily, who conceivably contributed something to the character of the later plays, and who cared for the poet in his retirement and last illness.

Of course, the essential interest of such a study rests in the figure of Shakespeare. The facts concerning his life have been set down, the record stands, and it seems unlikely that anything will be added in the future by historical research. And yet so great is the commanding genius of this man that the world is not content to leave him alone. The mass of Shakespearean commentary is enough to appal if not confuse the average man. This dilemma, however, is largely resolved in certain observations. There is, first of all, consolation in the fact that, as Mr. Logan Pearsall Smith puts it, three-quarters of Shakespearean scholars are touched with a strange madness. Perspective may be gained further by remembering that, because genius is made of such universal stuff, each man after all creates his own "essential Shakespeare". Moreover, common sense confirms the truth of Matthew Arnold's statement, when he wrote of Shakespeare: "Others abide our question, thou art free". And, finally, when the last word concerning Shakespeare has been said, the average reader will be content with what has been preserved to us. He may indulge in some speculations, but, realizing the contradictions and uncertainties of history, he will accept the fact that there are many questions which can never be answered, and let it go at that.

"Ah, what a dusty answer gets the soul,
When hot for certainties in this our life."

So it is not proposed in this paper to enter into the boundless controversies that rage around

* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Historical Medicine, Toronto, June 19, 1940.

the association of Shakespeare with his native town. That way madness lies. We are content to let the record stand for better or worse. The critics by their arguments and their theorizing, far from bringing the figure of Shakespeare more clearly before us, have produced a vast opacity about the man and his times. Through the person of John Hall we can pierce that cloud and get at least a glimpse of the man who was Shakespeare. And always, in exploring the scenes in which genius expressed itself, like the pilgrims of other times, we acquire a kind of merit.

II.

John Hall was born in 1575, the son of William Hall, a practitioner in medicine at Acton, Middlesex, who, from the terms of his will, had been trained in the tradition of the great physician, Jerome Cardan, which placed emphasis on astrology and alchemy. John received a good education, but whether at Oxford or Cambridge is not known. After leaving the university he travelled and studied on the continent as medical students did, and probably obtained his medical degree in France. So far as is known he had no licence to practise medicine in England. He probably began practice about 1600. The first reference to his presence in Stratford is the entry in the parish register of his marriage to Susanna Shakespeare, June 5, 1607. Previous to that time he had probably lodged in the town with some Dame Quickly, and must for some time have been a frequent visitor at Shakespeare's house, New Place, the most imposing in the town.

After their marriage the Halls lived in a house called "Hall's Croft" in that part of Stratford known as the Old Town. Hall soon acquired a large and fashionable practice which extended beyond the neighbouring shires. He was frequently called to treat the Earl and Countess of Northampton and, as his case-books show, often rode as far afield as Worcester and Ludlow. As we shall see, he held strong Puritan views, but still included Catholics among his patients.

In 1610, three years after Hall's marriage, Shakespeare returned from London to take up permanent residence in New Place, and there he spent the last six years of his life. In the absence of any record to the contrary, these were presumably peaceful years, varied by frequent visits to London. He lived upon friendly terms with the citizens and gentry of the neighbourhood, though it can hardly be supposed that the relation was very intimate on account of the pronounced Puritan leanings of the majority of Stratford citizens. This Puritan feeling (supreme irony!) was especially strong in its antipathy to stage performances, the Corporation refusing to admit players to the town. Such sentiment and the proverbial failure of contemporaries to recognize genius explain in part at least the fact that Stratford was wholly unconscious of the greatness of her son. To his homely neighbours he was nothing more than a man of substance who had been an "actor-fellow". In such a provincial and unimaginative society Shakespeare could hardly fail to be interested in his son-in-law, Hall, with his background of education and travel and his knowledge of the French language.

In "Pericles" to which is assigned the date 1608, one is tempted to think that Shakespeare had Doctor Hall in mind in the character of the Lord Cerimon. Gentlemen, roused by the storm, find Cerimon up and about at dawn, despatching his men to the apothecary and preparing for patients that the tempest might bring. In answer to their astonishment he says:

> " 'Tis known I ever
> Have studied physic, through which secret art
> By turning o'er authorities, I have
> Together with my practice, made familiar
> To me and to my aid the blest infusions
> That dwell in vegetives, in metals, stones;
> And I can speak of the disturbances
> That Nature works, and of her cures; which doth give me
> A more content in course of true delight
> Than to be thirsty after tottering honour
> Or tie my treasure up in silken bags
> To please the fool and Death."
>
> (III, 2, 31-42)

Whether Shakespeare achieved peace and contentment in the pastoral scenes and under the wide sky of Stratford is a matter of speculation. The strong Puritan spirit in his own home and in Doctor Hall and his wife Susanna can hardly have been to his liking. The town records of Stratford show that his family in 1614 (it is supposed that Shakespeare was absent in London at the time) entertained at New Place a travelling Puritan preacher. According to custom, the town provided refreshment for this man, the municipal accounts reading:

> "Item, for one quart of sack and one quart of clarett wine, given to a preacher at the New Place, xx d."

There were other troubles. Gossip touched Doctor Hall's household, and in July, 1613, we find Mrs. Hall, with her father's assistance, bringing an action for slander against John Lane, of Stratford, in the ecclesiastical court at Worcester, on the ground that he had reported her having illicit relations with one, Ralph Smith. The defendant did not appear and was excommunicated. Then there was the disturbance over the Welcombe land enclosure already referred to. On February 10, 1616, his younger daughter Judith made what later turned out to be an imprudent marriage with Thomas Quiney, and the ceremony taking place in a season prohibited by canon law led to the formal excommunication of the pair.

Shakespeare died on April 23, 1616, in his fifty-second year. Doctor Hall presumably attended him, but there is no record of the fact, Hall in his case-books as we shall see mentioning only his "cures". Tradition gives the cause of

his death as some epidemic disorder. John Ward, at one time a student of medicine and later vicar of Stratford, in 1662 writes that "Shakespear, Drayton, and Ben Jhonson, had a merry meeting, and itt seems drank too hard, for Shakespear died of a feavour there contracted." There is nothing convincing in the attempts which have been made to establish the precise nature of Shakespeare's medical history. As Sir E. K. Chambers dryly remarks, "The diagnoses of doctors are even less reliable when the patient is not before them than when he is." According to the terms of Shakespeare's will the bulk of his property was left to Susanna and her heirs. Doctor John Hall and his wife Susanna were the joint executors, and with them therefore lies the mystery of the loss of all the poet's papers and manuscripts.

Shakespeare was buried under the chancel of Stratford church. The flagstone over the grave bearing the famous doggerel curse was surely none of John Hall's doing, as it might have served for any poor fellow of the town. On the chancel wall is the bust by a London mason, Janssen, which has been the scandal of three centuries. The monument contains Shakespeare's coat of arms, and, below, the customary laudatory inscription in English prefaced by two lines of bad Latin. Brandes states that this inscription was probably written by Doctor Hall, but there is no authority for such a conjecture. Thus in this prosaic way for Shakespeare himself, in "spite of cormorant devouring Time" is achieved the ambition of the king in "Love's Labour's Lost".

> "Let fame, that all hunt after in their lives,
> Live register'd upon our brazen tombs,
> And then grace us in the disgrace of death."

III.

From this time on Hall's career as a busy physician and townsman of Stratford may be followed from the documents of the time. On Shakespeare's death Hall with his wife and daughter, Elizabeth, eight years old, moved to New Place where Anne, Shakespeare's widow, was a member of the family until her death in 1623. Hall was elected a burgess of the Corporation in 1617 and again in 1622, but on both occasions he was excused from office because of his professional duties which by this time had become onerous. In 1624 he assigned to the corporation for £400 the lease of the tithes of Old Stratford, Welcombe and Bishopton, which Shakespeare had possessed from 1605 and bequeathed to his heirs. An indication of his position in the community is found in the record of 1626, when he was fined £10 for refusing a knighthood on the coronation of King Charles I. On April 22nd of the same year his daughter Elizabeth was married to Thomas Nash, of Lincoln's Inn.

Hall was an ardent churchman and Puritan, a man of strong convictions and passions, of like temper to the times in which religious and political feelings ran high. He gave a costly pulpit to the church and was a staunch supporter of the eloquent, headstrong vicar, Thomas Wilson. In 1629 he was appointed a churchwarden for the parish, and with his fellow-wardens, Anthony Smith and George Barton, zealously carried out his duties. Parishioners were brought up on charges that make a pretty catalogue of offences to modern eyes—"sleeping in the belfry with a hat on upon the Sabbath"; "loitering forth of church at sermon-time"; "in the company of an excommunicated person"; "keeping naughty company"; "wearing a hat in church"; "being abroad seen by the Constable at sermon-time"; "for late coming to church"; "having no employment but laziness"; "using beastly behaviour"; "calling a woman witch"; "being a common swearer and blasphemer"; "being a drunkard". Such was the discipline of the erring in the robust days of the Elizabethan period.

In 1632, much against his will, Doctor Hall was elected a burgess of the town, probably because of his championship of the vicar who was conducting a vigorous feud with the Corporation. His clerical sympathies and continual quarrels over the matter of fines for his non-attendance kept him in trouble with his fellow members. Apparently Hall experienced the traditional difficulty of a physician to combine professional and public duty. A letter from an indignant patient has been preserved demanding his attendance at the same time as a council session, which doubtless caused Hall to miss still another meeting. The disputes continued, and finally Hall was called to appear before the Corporation to answer the charge of abusive speeches against the bailiff, Richard Castle, known locally as "Shake-Elbows". The worthy doctor had been granted by the vicar and bishop an exchange of his pew in the church from one near the pulpit on the south of the nave to another on the north side of the nave previously occupied by the aldermen and their wives. The bailiff and the other burgesses objected to the move and a first-class row resulted. On October 9, 1633, by 19 votes to 3, Hall was expelled from the Council for "wilful breach of orders", sundry other misdemeanours, and "continual disturbances". The battle continued. A Sunday or two later the sober congregation of Stratford church doubtless enjoyed the spectacle of a scuffle for the possession of the disputed pew. The vicar held a special court at New Place. He and Dr. Hall filed a petition in Chancery against the Corporation, charging that body among other things with "feasting and private use of the revenues". Eventually an inquiry was held by the vicar-general of the diocese; Dr. Hall was awarded his new pew and the vicar was suspended for three months.

Hall also had to contend with the family difficulties of his brother-in-law Thomas Quiney, the

husband of Judith Shakespeare. Quiney who was proprietor of the Cage Tavern "fell, like Bardolph, a victim to the temptations of his calling", was repeatedly fined for such offenses as swearing and allowing tippling in his house, and finally Dr. Hall and his son-in-law, Thomas Nash, were obliged to take over the business in trust for the wife and children. All this time Hall was carrying on a most demanding practice which took him up and down several counties, and, Puritan as he was, treating patients of all classes, including (as a contemporary, Dr. John Bird, notes) "even such as hated him for his religion".

The chronicle of all these trivial but very human episodes enables us to form some sort of a picture of the man who was Shakespeare's executor. The man of education and friend of the poet, the efficient business-man, the honest Puritan and churchman, the bulwark of the family, the hard-driven physician trying to reconcile medical duties and the demands made upon his time by an inconsiderate corporation, the vigorous fighter, the physician of more than local fame—altogether a figure not unlike his sturdy contemporary of the same century, Thomas Sydenham.

Doctor Hall died suddenly on November 25, 1635, in his sixtieth year. The burial entry in the parish register reads: "Nov. 26, 1635. Johannes Hall, medicus peritissimus". He was buried in the parish church within the chancel near Shakespeare. In his will he left a house in London to his wife, a house at Acton and a meadow to his daughter, and his goods otherwise to his wife and daughter. He states in the will that he had planned leaving "his study of books" and his manuscripts to a Mr. Boles, but as he was not present, he bequeathed them to his son-in-law, Thomas Nash to be burnt or disposed of as he saw fit. Beyond the doctor's case-books, nothing is now known of this material, which may have included some of Shakespeare's manuscripts. Like the rest of Shakespeare's material inheritance it has vanished.

IV.

A book constitutes one of the most certain passports to a measure of immortality. In Doctor Hall's case the measure is small indeed, but the volume which bears his name is one of the rarer volumes in the Shakespearean corpus and among medical works. It is a compilation of 200 case-reports from the doctor's manuscripts. The original manuscript written by Hall in Latin is now in the British Museum (Egerton MS 2065). The way in which the book came to be published is in the best tradition of book-lore. In 1642, during the civil war, James Cooke, a Warwickshire surgeon with a detachment of the parliamentary army stationed at Stratford, was informed by a friend that Mrs. Hall at the New Place had some books and manuscripts which had belonged to her late husband. He visited New Place, was shown the material by Mrs. Hall, and after some argument (as he notes in the Preface) purchased some of the manuscripts. One gathers from Surgeon Cooke's account that Susanna had a considerable shrewdness in bargaining, that she knew little or nothing of the value of the materials in her possession, and that apparently she was not acquainted with her husband's handwriting. In passing judgment in this fashion, however, it should be remembered that the average woman of the time had very little in the way of education. (Susanna's own signature would tend to confirm this). Such a circumstance in Susanna's case would further explain why Shakespeare's own family put such little value upon his work.

The manuscript was submitted by Cooke to Dr. John Bird, the Linacre professor of medicine in London, was translated into English, and published in 1657. It is a duodecimo volume and bears the following title-page (Fig. 1):

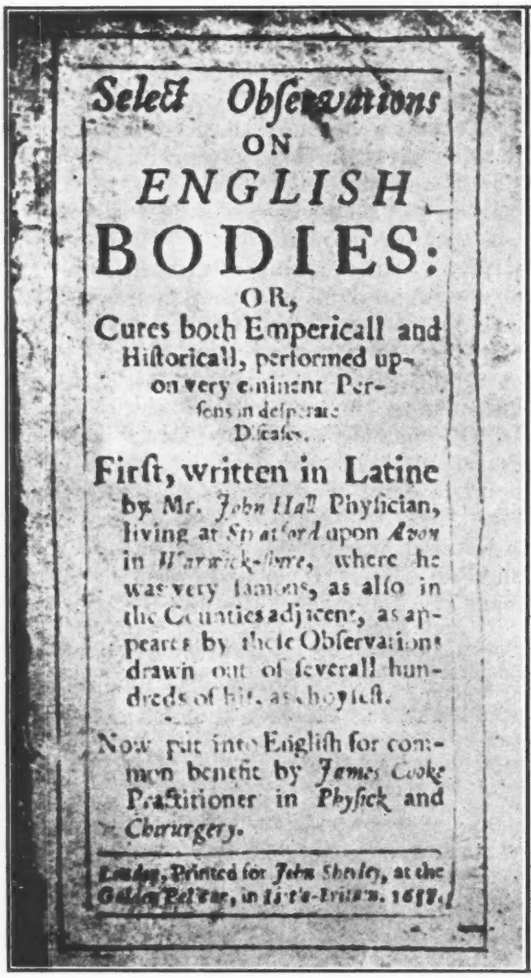
> "Select observations on English Bodies: or Cures both Empericale and Historicall, performed upon very eminent Persons in desperate Diseases. First written in Latine by Mr. John Hall, Physician, living at Stratford upon Avon in Warwickshire, where he was very famous, as also in the Counties adjacent, as appeares by these Observations drawn out of several hundred of his, as choysist. Now put into English for common benefit by James Cooke, Practitioner in Physick and Chirurgery. London, Printed for John Sherley, at the Golden Pelican, in Little-Britain, 1657."

A second edition dedicated to Fulke Greville, Lord Brooke, was issued in 1679 and a third edition in 1683. It is no small compliment to a physician to have his cases published twenty-two years after his death and to have them run through three editions.

The book contains brief reports on cases which Doctor Hall with the formidable materia medica of the time was fortunate enough to cure. The patients cover a wide social range, the diseases are most diverse, and the records are set down in the colloquial speech of the day. The interest of the book lies in the picture which it gives of the medicine of the time, a therapeutic combination of formulated superstition and gross empiricism.

Hall was above the average level of the general practitioner of his time. He professed no surgery, leaving that to the barbers; his physiology was based upon the Hippocratic conception of the humours, comfortably buttressed by a somewhat fatalistic belief in the will of God; his clinical practice resolved itself into therapeutic ingenuity which at times is almost as overpowering to the reader as it must have been to the patient.

The diseases recorded cover most of the medical field. Gynæcological complaints are common; menorrhagias, post-partum sepsis, vaginal discharge. Various fevers of course are met with frequently, smallpox, respiratory ailments, notably asthma, gastric and intestinal disorders,



Select Observations
ON
ENGLISH
BODIES:
OR,
Cures both Empericall and Hiſtoricall, performed upon very eminent Perſons in deſperate Diſeaſes.
Firſt, written in Latine by Mr. John Hall Phyſician, living at Stratford upon Avon in Warwick-ſhire, where he was very famous, as alſo in the Counties adjacent, as appeares by theſe Obſervations drawn out of ſeverall hundreds of his, as choyceſt.
Now put into Engliſh for common benefit by James Cooke Practitioner in Phyſick and Chirurgery.
London, Printed for John Sharley, at the Golden Bell in Little-Britain. 1657.

Fig. 1

HEERE LYETH YE BODY OF IOHN HALL GENT : HEE MARR : SVSANNA YE DAVGH & coheire TER OF WILL : SHAKESPEARE, GENT. HEE DECEASED NOVER 25 AO 1635, AGED 60.

" Hallius hic situs est, medica celeberrimus arte ;
Expectans regni Gaudia læta Dei ;
Dignus erat meritis qui nestora vinceret annis,
In terris omnes, sed capit æqua dies ;
Ne tumulo quid desit adest fidessima coniux,
Et vitæ comitem nunc quoq. mortis habet."

Fig. 2

as one would expect in an age of heavy eating, gonorrhœa and the inevitable "worms". Bladder, skin and eye troubles are attacked heroically. Cases of "cancer" are listed among the cures. Hall, like many a modern physician, had his "pet disease"; in his case it was scurvy, and anti-scorbutics are the prime ingredients in his remedies. Functional conditions and hysteria (called by Hall "the Mother") seem to have been as common then as today. The "French pox" is referred to in one case. There is gout, but Hall apparently had found no cure for arthritis.

The materia medica which he employed consisted largely of Galenical plants, but occasionally such mediæval remedies as the dried windpipe of a cock, the spawn of frogs, and the dung of various animals appear. Formidable "gunshot" prescriptions with as many as 28 ingredients were employed. The preparation of some of the concoctions would tax the ingenuity of any man, and therein if at all would lie the art of medicine which he practised. The usual scheme of treatment rested on the basis of purgation, producing a sweat and, with such initial advantage, following up with the copious draughts of medicine and such measures as plasters, inhalations, cupping, and, only occasionally, bleeding. Hall had his favourite remedies to which he applies such comments as, "This treatment is excellent and worth gold". One of his sedatives is referred to as "Laudanum Paracelsi", confirming the tradition which credits Paracelsus with the first use of laudanum. One is curious to know the composition of the item "extract hystericum". Sometimes his mixtures were not well received by even a generation conditioned to such heroic purging, for he notes, "but after she had taken it once, she abhorred it". Frequently in connection with cases he applies the delightful traditional comment, that the patient was cured "*tuto, cito et jucunde*" (quickly, safely and pleasantly).

His patients cover the whole range of Tudor society, from earls to household servants. It is a motley company: Lady Beaufoy ("godly, honest, being of noble extract, healthful to the age of 28"); My Lady Rainsford ("beautiful and of gallant structure of body"); Lady Browne of Radford ("Roman Catholic cruelly afflicted with wind"); Lady Dickenson ("fair, pious, chaste, vexed with a pain in the head"); the Countess of Northampton ("born of a noble offspring, notably educated, and of a very good

disposition, very fair and beautiful"); Squire Pauckington ("troubled with want of appetite"); William Clavel ("troubled with a virulent gonorrhœa"). The earliest case report is dated 1617 when he attended Lord Compton, who later left for Scotland with the King.

Among the patients were friends and relatives of Shakespeare: "Mister Drayton, an excellent poet, labouring of a tertian"; the family of Quiney, one of whom, Thomas, Judith Shakespeare married; Mrs. Sadler, of whose family Hamnet was an intimate friend of Shakespeare. There are two references to illnesses of Susanna, Hall's wife, one of which may be quoted:

"Obs. 19. Mrs. Hall of Stratford my wife, being miserably tormented with the colick, was cured as followeth: ℞ Diaphæn. Diacatholic. ana ℥ i; Lact. q. s. f. Clyst. This injected gave two stools, yet the pain continued, being but little mitigated, therefore I appointed to inject a pint of sack made hot, this presently brought forth a great deale of wind, and freed her from all pain, to her stomach was applyed a plaster de Labd. Cret. cum Canan. et Spec. Aromat. rosat. et Ol. Macis. With one of these glysters I delivered the Earle of Northampton from a grievous colick."

Of his daughter, Elizabeth, Shakespeare's granddaughter, he records:

"Obs. 36. Elizabeth Hall my onely daughter was vexed with totura oris or the convulsion of the mouth, and was happily cured as followeth. First I exhibited these pills: ℞ Pil. Coch. et Aureas, ana ℥ i; f. pil. 10. She took five the first day which gave her seven stooles. I fomented the part with Theriac. Androniac and Aq. Vitæ. To her neck was used this, ℞ Lingu. Martiat. Magn. ℥ i; Ol. Laverin. petrolei, Castor. et Terebinth. ana ℥ iss de lateribus ℥ i; misce. by this she had great advantage, her courses being obstructed, thus I purged her. ℞ Pil. fœtid. ℥ i Castor ℥ i; de Succin. rhab. egaric. ana scruple i; f. Mass. she took five pills in the morning," etc.

The account goes on to relate that in April she went to London (probably to participate with her father in the functions connected with the death of King James) and returning home on the 22nd "she took cold and fell into the said distemper on the contrary side of the face, and although grievously afflicted with it, yet by the blessing of God she was cured in sixteen days as followeth. . . . In the same year May 24th she was afflicted with an erratic fever; sometimes she was hot, bye and bye sweating, again cold, all in the space of half an hour, and thus she was cured of it in a day. . . . Thus she was delivered from death and deadly disease and was well for many years, to God be praise."

There is a lengthy account of his own illness, prefaced with a prayer.

"Obs. 60. (2) Thou O Lord who has the power of life and death, and drawest from the fates of death, I confesse without any art or counsell of Man, but only from thy goodnesse and clemency; Thou hast saved me from the bitter and deadly symptoms of a deadly fever, beyond the expectation of all about me, restoring me as it were from the very jaws of death to former health, for which I praise thy name, O most merciful God, and Father of Our Lord Jesus Christ, praying Thee to give me a most thankfull heart for this great favor, for which I have cause to admire Thee."

In 1632, his 57th year, he suffered severely with hæmorrhoids, but, like many another physician, "was constrained to go to several places to patients". Fever and delirium followed which were cured by purging and opening a live pigeon and applying it to his feet "to draw down the vapours". Two physicians were called in. There followed more purging, more dosing, bleeding, and leeches applied to the hæmorrhoids. He winds up the account: "And so I became perfectly well, praised be God".

One or two short case reports will give the character of Hall's medical expression.

"Obs. 95. One Hudson a poor man labouring of a swimming in his head, called Vertigo. I caused ℥ x of blood to be taken from the Cephalica, purged him with pil. Aurear. et Cochear. ana scruples ii, Troch. alhand. gr. viii. f. pil. 7. they gave nine stooles. Lastly he took Peacock dung dryed ℥ i, infused in white wine for a night, and after strained, and this he continued from new moon to full moon, and was cured."

"Obs. 35. A child of Mr. Walkers of Ilmington, minister, aged six moneths afflicted with falling-sickness, by consent was thus freed. First I caused round pieces of piony root to be hanged about the neck, when the fit afflicted I commanded to be applyed with a spunge to the nostrils the juyce of Rue mixt with White Wine Vinegar, by the use of which it was presently recovered. and falling into the fit again, it was removed in the same manner. To the region of the heart was applyed the following. ℞ Theriac. Ver. ℥ ii Rad. palon. pul. ℥ ss misc. The haire was powdered with powder of the roots of pioney and thus the child was delivered from all its fits."

V.

We have rescued from the envious wallet of Time a few bits of the story of the Warwickshire physician, John Hall. In him, as in his wife Susanna, one can imagine that there was "something of Shakespeare". And what of Shakespeare himself, the enigma of the centuries? Sir Walter Raleigh's answer would seem to suffice:

"Is the real man to be sought in that fragmentary story of Stratford and London, which, do what we will to revive it, has long ago grown faint as the memory of a last year's carouse? That short and troubled time of his passage, during which he was hurried onward at an ever-increasing pace, blown upon by hopes and fears, cast down and uplifted, has gone like a dream, and has taken him bodily along with it. But his work remains. He wove upon the roaring loom of Time the garment that we see him by; and the earth at Stratford closed over the broken shuttle."

Shakespeare's hope, so apparent in his will, of founding a family was destined to failure. Three children were born to Shakespeare and Anne Hathaway; a son Hamnet, the daughters Judith and Susanna. Hamnet died in 1596 in his 12th year. Judith who married the wayward Thomas Quiney had three sons, all of whom died before reaching manhood. Susanna Hall survived her husband by fourteen years, dying in 1649. The first four lines of the verse on her tombstone read as follows:

"Witty above her sex, but that's not all,
Wise to salvation was good Mistress Hall.
Something of Shakespeare was in that, but this
Wholly of him with whom she's now in blisse."

The Halls' only child, Elizabeth, lost her husband, Thomas Nash, of Stratford in 1649, and two years later married Sir John Bernard, of Abington in Northamptonshire. There were no children by either marriage. Elizabeth, the last descendant of William Shakespeare died in 1670.

The memory of Stratford-on-Avon which the modern pilgrim treasures most fondly is the beautiful vista stretching from the arched Clopton bridge to the old church—the sweep of the river Avon with the willows bending down to the water's edge, the avenue alongside shaded by ancient elms, the slender spire of Holy Trinity church in the distance. Within the altar rails of the church are the flat stones covering the graves of the Shakespearean household—Anne, Shakespeare himself, Thomas Nash, John Hall and Susanna. On the monumental slab covering Hall's grave (Fig. 2) is a shield bearing his coat of arms, and below the following inscription:

> "Here lieth ye Body of John Hall, gent.: Hee marr: Susanna, ye daughter and coheir of Will: Shakespeare, gent. Hee deceased Nover 25. Anno 1635, aged 60."

There follow Latin lines, translated thus:

> Here is the dust of Hall, most famous in medical art, awaiting the glorious joys of the Kingdom of God. Worthy was he to have surpassed Nestor in well-earned years, in every land, but impartial Time has snatched him away. Lest anything be wanting to the tomb, his most faithful spouse is there, and he has the companion of life now also in death.

Hospital Service Department Notes

Hospital Care Insurance Endorsed at the Maritime Hospital Convention

Hospital care insurance was one of the major subjects discussed at the recent meeting in Bridgewater of the Hospital Association of Nova Scotia and Prince Edward Island. There was general agreement that the numerous hospitalization plans operating in the eastern portion of Nova Scotia had proved conclusively the value of this form of voluntary insurance. In her address on this subject Sister Marie Michael, of St. Francis Xavier University, considered the medical as well as the hospital viewpoint, and stated that the co-operative system is the logical alternative between our present system, which is unfair both to the public and to the doctors, and an equally undesirable bureaucracy-controlled system of state medicine. The Association appointed a special committee to consider the possibility of setting up a province-wide plan of hospital insurance and, in the interval, more intensive educational measures will be undertaken.

An endeavour is to be made, also, to clear up the confusing situation with respect to compensation cases. In a number of the mining areas patients do not come under the Workmen's Compensation Board, but are compensated under an arrangement effected some years ago between the United Mine Workers and the operators. This has been far from satisfactory to the hospitals, as also have been several features of the arrangements with the Workmen's Compensation Board. At a special session of delegates from the women's auxiliaries a committee was named to consider a province-wide organization for next year. Dr. P. S. Campbell, of Halifax, led a discussion on hospital accounting; Rev. J. R. MacDonald, of Antigonish, one on the problems of hospital trustees; and Dr. Harvey Agnew, of Toronto, one on administrative subjects.

Rev. Mother Ignatius, of Glace Bay, was re-elected President. Other officers are: *Vice-presidents,* B. H. Wetmore, of Yarmouth and Rev. M. J. McKinnon, of Glace Bay; *Secretary,* Miss Anne Slattery, of Port Morien.

All Communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, 184 College Street, Toronto.

The War

A New, Inexpensive Muslin Splint which can Be Used for War Wounded

A simple, inexpensive muscular ankle restraining splint made of muslin that can be used not only for infantile paralysis cases but also as an improved safeguard in the transportation of wounded soldiers, is described in the *Journal of the American Medical Association* for September 28th.

"In addition to its simplicity it is inexpensive, can be made universally available, and can be used repeatedly. The indication for its use is as a temporary substitute for the generally used plaster and metal splints for the extremities." In mild cases of infantile paralysis in which there is no or only a slight paralysis of the muscles of the extremities the splint may be used throughout the acute and subacute stages of the disease.

It consists of 6 by 36 inch strips of unbleached muslin, at the ends of which are tapes to be fastened to the mattress or bed posts. About 9 inches from each end shorter strips of muslin are attached. These strips loop around the patient's wrist, ankle, foot or thigh. The entire restraint-splint can be improvised from an old sheet or towel and a ball of twine or some shoe laces and safety-pins. It can be used in a respirator, a farm house, or an automobile trailer.

"The simplicity of the restraint-splint and the relative ease of large quantity manufacture may well render it useful at the battle front during the periods of transportation and temporary care of the wounded. Injured extremities can be rapidly immobilized with this type of restraint-splint, which can be used on a stretcher as well as on a hospital bed."—M. Kaplan, S. O. Levinson and P. Lewin, *J. Am. M. Ass.*, 1940, **115**: 1098.

The following item sent out to 140,000 physicians in the United States by the "Committee to Defend America by Aiding the Allies" is informative and will be of interest to Canadians.

"Dear Colleague:

If you believe as we do—

That America has long been in this war in the rôle of sleeping prospective victim; that the struggle for freedom abroad is a delaying action in *our* war; that the British fleet is our present chief defense; and that our wish to *Keep the War out of America* can best be favoured by *all possible* aid to Britain—"possible" meaning within the discretion of our state and service departments, freed from needlessly restrictive legislation—if you believe these things, we invite your active participation in the work of this Committee.

There is much to be done. *First*, enrol with your local branch or start one in your community—to keep in touch with rapidly changing events and needs for action. Write to the Committee for information.

Second, make your influence count. This means, at the moment, your own letters or telegrams to presidential candidates and congressmen; then letters from as many other persons as you can influence—brief letters, stressing the need for utmost possible aid. President Roosevelt should be addressed to the White House, Wendell Willkie to Republican Headquarters, New York, your senators at the U.S. Senate and your representative in the House of Representatives.

And, *third*, will you send a contribution today to the Committee so that it may expand and intensify its work in arousing America from its rôle of sleeping prospective victim? With nation after nation it has been 'too little and too late'. Please make cheques payable to Frederick C. McKee, Treasurer, and send to the Committee in the enclosed envelope.

Sincerely years,

Sub-committee for Medicine, Emile Holman, M.D., Eugene S. Kilgore, M.D., Roger I. Lee, M.D., Warfield T. Longcope, M.D., J. H. Musser, M.D., D. B. Phemister, M.D., Ray Lyman Wilbur, M.D.

P.S.—Tentative plans are forming to circularize other professional and non-professional groups. Much will depend upon the response of the doctors. If you are in accord with our purpose, your immediate reply will be most helpful.—Committee."

War Literature

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Wartime precautions for diabetics, Lawrence, R. D.: 1940, **2**: 316.

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Examination of the recruit, Lt.-Col. A. R. Hagerman: 1940, **43**: 314.

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The late complications of abdominal war-wounds, Ogilvie, W. H.: 1940, **2**: 253.

A week-end with the war neuroses, Culpin, M.: 1940, **2**: 257.

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A field ambulance in war, Hardy, E. B.: 1940, **1**: 2.

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BOOKS

Treatment of Wound Shock (Medical Research Council Committee) M.R.C. War Memorandum No. 1, H.M. Stationery Office, London, Price 4d., postage extra.

Shell Shock in France, 1914-1918, Charles S. Myers: Macmillans, Toronto, $1.35.

Treatment of War Wounds and Fractures, J. Trueta: Paul B. Hoeber, Inc., New York, 1940, $2.50.

There'll Always Be An England

There'll always be an England, while there's a country lane
Wherever there's a cottage small, beside a field of grain.
There'll always be an England while there's a busy street;
Wherever there's a turning wheel, a million marching feet,
Red, white and blue, What does it mean to you?
Surely you're proud, shout it aloud, Britons awake.
The Empire too, we can depend on you,
Freedom remains, these are the chains nothing can break,
There'll always be an England, and England shall be free,
If England means as much to you as England means to me.

—Ross Parker.

Divisions of the Association

Alberta Division

The fifth annual meeting of the Canadian Medical Association, Alberta Division, was held at the Palliser Hotel, Calgary, on September 12, 13 and 14, 1940.

Amid sunny skies and delightful early autumn weather, the attendance was larger than anticipated, this second year of the second world war, when many of our members are in uniform and when our thoughts are centred largely on the unceasing conflict. This was one of the most successful of the thirty-five meetings which have been held since the organization of the Alberta Medical Association in 1906.

We had as our guest speaker from the neighbouring republic, Dr. J. S. Coulter, Head of the Physical Therapy Department, Northwestern University, Chicago. We were fortunate in having such an array of excellent lecturers provided by the Canadian Medical Association. These included Dr. Duncan Graham, Professor of Medicine, University of Toronto; Dr. J. Harold Couch, Department of Surgery, University of Toronto; Dr. H. W. Wookey, Department of Surgery, University of Toronto; Dr. W. deM. Scriver, Department of Medicine, McGill University; also Dr. T. C. Routley, General Secretary, Canadian Medical Association, Toronto.

Dr. J. S. Coulter gave a lecture on "Physical therapy in chronic arthritis" and a public address in Central United Church on "Natural agents for restoration of health after injury or disease". Professor Duncan Graham gave a lecture on "Sulphanilamide and related compounds in the treatment of infections", and at a luncheon at the Palliser Hotel spoke in his capacity as President of the Canadian Medical Association. He gave a fine address on the aims of our national organization during the war and the organization of our members to assist in meeting eventualities.

Dr. J. H. Couch gave a lecture on "Recent advances in fractures" illustrated by numerous slides, also one on "The injection treatment of varicose veins and hæmorrhoids".

Dr. H. Wookey's subject was "Recent advances in the surgical treatment of cancer". He also gave a public address at Central United Church on the cancer problem, in which he stated that "the cancer problem is going to be mastered. A great deal can be done for it now, and more if you co-operate."

Dr. W. deM. Scriver spoke on "The management of nephritis in the past twenty years", also on "Diabetes as a quantitative disease".

Round-table discussions on the treatment of fractures (recent advances in)—gynæcology and obstetrics, pædiatrics; new drugs—their uses in general medicine and obstetrics; the treatment of peptic ulcer, were participated in by a number of our members.

Two outstanding instructive exhibits were on display, one a mycological display including pathogenic fungi of Alberta, by Dr. Harold Orr and Eleanor Silver Dowding, Ph.D., and the other an exhibit of causative agent in "hay fever", "eczema", and "asthma" by Dr. Lola McLatchie, and Miss B. M. Forcade, M.T. In this latter exhibit 48 different specimens of plants, fruit and vegetables were shown.

It was decided to hold the next annual meeting in Edmonton at a time to be arranged in co-operation with the Associations of the three other western provinces, the date to be some time in September.

Among the important resolutions passed at the Convention were:

1. That in any scheme of cancer control (diagnosis or treatment), the interest and assistance of the general practitioner must be retained. That a general use of the present available facilities be made. A thorough co-operation of specialists, and general practitioners is absolutely necessary for the success of the plan. It was further resolved that the Government be offered co-operation by the profession.

According to the Constitution, the business of the Division is done by the Board of Representatives with a definite, fixed quorum, and as this quorum is not always available and as the Constitution does not provide for ordinary members of the Convention taking part in the business, it was moved, seconded and carried that at the next regular meeting the following resolution would be presented:

"That the proper officers of the Division be requested to take the necessary steps to provide for the conduct of business of the Division, at a regularly called meeting of the members of the Division, which meeting having present a quorum of forty members, and that the necessary amendments to the Constitution be made."

The following officers were elected for 1940-1941. *President*—Dr. F. T. Campbell, Calgary; *President-elect*—Dr. J. Ross Vant, Edmonton; *Librarian*—Dr. G. E. Learmonth, Calgary; *Secretary-treasurer*—Dr. George R. Johnson, Calgary.

At a luncheon meeting, Dr. T. C. Routley, General Secretary of the Canadian Medical Association dealt with the question of the evacuation of children of British doctors to homes of Canadian doctors. It was hoped that 1,500 children would be accommodated, and the co-operation of the federal and provincial governments had been obtained. He also referred to the physical examination of young men to be called up for military training and the part the physicians of Canada would take.

The annual banquet was held at the Palliser Hotel, and was presided over by Dr. Fulton Gillespie. The speaker of the evening was Mr. R. H. Painter, entomologist, on the staff of the Government Experimental Farm at Lethbridge. His address was on "Insects in relation to the spread of disease" and was exceedingly humorous, yet highly scientific, and he covered a wide range of knowledge of human and other insectiverous pests.

At the Calgary Golf and Country Club the annual competition for the Kennedy Cup was played off, and the winner was Dr. J. Ross Vant, of Edmonton.

The visiting ladies were well looked after by the wives of the Calgary members. There was golf at the Country Club, a sight-seeing drive, a theatre party, and dinner and bridge at the Ranchmen's Club, while Dr. and Mrs. H. N. Jennings entertained the members and their wives to afternoon tea at their spacious home and grounds.

G. E. LEARMONTH

British Columbia Division

The annual meeting of the Canadian Medical Association, British Columbia Division, was a very successful one. The weather at Nelson, where it was held, was perfect, and the profession of Nelson organized the whole affair splendidly. The City of Nelson welcomed us through its mayor, and the business men of the city went out of their way to show hospitality, members of the Board of Trade giving up their time and the use of their cars for the members' benefit.

Some 100 members were present, a very good showing indeed, considering everything. Many doctors brought their wives with them, and the latter were very hospitably entertained by the ladies of Nelson. The scientific program was excellent, and altogether it was one of the best annual meetings ever held in the province.

The following have been elected officers of the British Columbia Division of the Canadian Medical Association. *President*—Dr. Murray Blair, of Vancouver; *First Vice-president*—Dr. C. H. Hankinson, of Prince Rupert; *Second Vice-president*—Dr. A. H. Spohn, of Vancouver; *Hon. Secretary-treasurer*—Dr. W. M. Paton, of Vancouver; *Immediate Past-president*—Dr. F. M. Auld; *Executive Secretary*—Dr. M. W. Thomas, Vancouver.

Manitoba Division

The annual meeting of the Canadian Medical Association, Manitoba Division, was distinguished this year by being held in conjunction with the Canadian Public Health Association. Meetings were held at the Fort Garry Hotel, Winnipeg, and at the Winnipeg General and St. Boniface Hospitals, with the annual golf tournament being played on the Niakwa course. Unfortunately illness prevented President W. E. Campbell from being present. Professor Daniel Nicholson was in charge of the scientific program.

We were grateful for the presence of visitors from the east: Dr. Duncan Graham, Toronto, President of the Canadian Medical Association, who gave an address at the dinner and business meeting of the Division, and also opened the discussion on duodenal ulcer; Dr. J. A. Ferrell, New York, Assistant Director of International Health Division of the Rockefeller Foundation, who was chairman of the Symposium on Maternal Welfare; Dr. E. Couture, Ottawa, Director, Child and Maternal Welfare Division; Dr. W. M. de Scriver, Montreal; Dr. J. H. Couch and Dr. Harold Wookey, Toronto, and Dr. D. H. Williams, Vancouver. The two last named physicians addressed a public meeting in the Auditorium Concert Hall under the chairmanship of Mr. R. G. Persse, President of the Manitoba Cancer Research Institute.

Dr. E. L. Ross, Superintendent of Manitoba Sanatorium, Ninette, was elected *President*, and Dr. W. R. Coad, *Secretary* of the Division.

The annual dinner and dance were graced with the presence of Lieutenant-Governor and Mrs. W. J. Tupper, and Premier and Mrs. John Bracken. At the dinner Dr. R. O. Davidson, President of the Canadian Public Health Association, presented life-memberships to Dr. E. W. Montgomery, first minister of health in Manitoba, and to Hon. Dr. J. M. Uhrich, Minister of Health in Saskatchewan. Dr. Montgomery paid tribute to the late Dr. Gordon Bell as an inspiration to those who worked with him in the interest of public health, and Dr. Uhrich praised the work of Dr. R. G. Ferguson and the Anti-Tuberculosis League of Saskatchewan.

Dr. Jean Gregoire, deputy minister of health, Quebec, was elected *President* of the Canadian Public Health Association at its 29th annual meeting. Others elected were Hon. Henri Groulx, minister of health and provincial secretary, Quebec, *Honorary President;* Drs. Grant Fleming, Montreal, J. J. McCann, Renfrew, Ont.,

B. T. McGhie, Toronto, and Arthur Wilson, Saskatoon, *Vice-presidents*. Resolutions urged that the federal government see that vitamin B derived from wheat germ be added to flour, and that all provincial governments enact legislation which would result in pasteurization of all milk and milk products distributed.

Dr. Ernest Couture said that the Canadian birth rate had dropped from 24.8 per 1,000 in 1926 to 20.03 per 1,000 population in 1939. This represented a difference of 50,000 live births. Neither could the Canadian infant mortality rate of 61 per 1,000 live births in 1939 be considered satisfactory, when New Zealand in 1937 had an infant mortality rate of 31, Australia, 38, United States, 54, England and Wales, 58.

ROSS MITCHELL

Medical Societies

The Academy of Medicine, Toronto

The annual dinner and stated meeting of the Academy of Medicine, Toronto, was held on October 1, 1940, in Osler Hall, 13 Queen's Park, with an attendance of 130 Fellows and guests. Dr. William Magner, the newly elected President, introduced to the Fellows a number of distinguished guests, including the Most Reverend Jas. C. McGuigan, Archbishop of Toronto, Sir William Mulock, P.C., K.C.M.G., Chancellor of the University of Toronto, President H. J. Cody, His Worship the Mayor of Toronto, Professor Duncan Graham, President of the Canadian Medical Association, Dr. A. B. Whytock, President of the Ontario Medical Association, Lt.-Col. A. R. Hagerman, District Medical Officer, M.D. 2, Dr. Edmund T. Guest, President of the Hamilton Academy of Medicine, and Dean Gallie, University of Toronto. Regrets were received from His Honour the Lieutenant-Governor of Ontario, the Hon. Mitchell F. Hepburn, Premier of Ontario, the Hon. Harold Kirby, Minister of Health, and Sir Robert Falconer, K.C.M.G.

Dr. D. E. Robertson, the immediate Past-president, was presented with a replica of the presidential badge of office. Following the precedent set last year, the winners of the Academy golf tournaments were presented with the trophies.

The President, in his inaugural address, said in part "While I am proud and glad to undertake the responsible duties which fall to the lot of your president, I could wish that my tenure of office had fallen in happier times, when our interest in Academy affairs was not clouded by anxiety and strain. If in this address I make but brief reference to the war, it is not because of any failure to realize that we are engaged in a desperate battle for our existence as a free nation within a free empire; it is not because of any want of interest in our army medical corps or of any lack of admiration for those of our Fellows, who, at home and abroad, are playing their parts with our armed forces. Rather it is because I know that we are as one in our realization of the nature of the struggle in which we are involved, and in our resolve to make any necessary sacrifices so that the struggle may be continued until, to quote Mr. Churchill, 'the curse of Hitler is removed from the world'. While our chief thought, our chief aim, must be to bring all the resources of our great country to the attainment of that end, I think that it would be lamentable if we, doctors and teachers of medicine who have in charge the health of the people, should show any slackness or want of interest in our professional work; and with this thought in mind I propose to do my utmost, with the help of Council, to conduct the affairs of the Academy as in normal times and to maintain the high standard of its scientific programs. I bespeak the interest and co-operation of the Fellows in that object."

Dr. Magner went on to speak of the brilliant advances which had been made in medical science during the past fifteen years, and stated that at no time did medicine offer a career so satisfying or so rich in potentialities of service to humanity. He closed his address with a quotation from Ecclesiasticus: "The skill of the physician shall lift up his head, and in the sight of great men he shall be praised."

E. W. MITCHELL,
Hon. Secretary.

The Montreal Medico-Chirurgical Society

The Eighth Annual Clinical Convention of the Montreal Medico-Chirurgical Society was held from October 9th to 12th, inclusive.

In spite of the troublous times it was found possible to extend this convention to four days, for the first time since it was inaugurated. The sessions were held as usual at the four main English teaching hospitals. On the same dates La Société Médicale de Montréal held its "Journées Médicales", to celebrate its fortieth anniversary. These took the form of clinical meetings at the main French hospitals in the city, the Notre Dame, the Hotel Dieu, Hôpital de la Miséricorde, and the Sacré-Cœur.

The attendance was as good as could have been expected. Many medical men are on active service, and this reduced the registration considerably. However, there was no question of the success of the meetings. The demand for this type of instruction is strong and the efforts made to meet it are thoroughly appreciated.

One innovation of some significance was the conjoined banquet of the two societies on the last evening of the convention. The joint chairmen were Drs. Oscar Mercier and George Hall. Many of the speeches were in French, but the

speakers were usually able to switch from one language to another with considerable facility. The spirit of good fellowship was most gratifying. We look for the continuance of these combined festive occasions as an annual affair.

The North Shore Medical Society

At the annual meeting of the North Shore Medical Society, held on September 11th, the following officers were elected: *President*—Dr. E. Therrien, West Vancouver; *Vice-president*—Dr. W. G. Saunders, North Vancouver; *Secretary-treasurer*—Dr. G. A. McLaughlin, North Vancouver.

La Société Canadienne-Française d'Electro-Radiologie

At its last meeting, held in Quebec on September 28th, La Société Canadienne-Française d'Electro-Radiologie chose a new board for the next two years: *President*—Dr. Albert Comtois, Hôpital Ste-Justine, Montreal; *First Vice-president* — Dr. Jules Gosselin (Major), Hôpital St-Sacrement, Quebec; *Second Vice-president*—Dr. Paul Brodeur, Hôpital Général, Ottawa; *General Secretary*—Dr. Origène Dufresne, Institut du Radium, Montreal; *General Treasurer* — Dr. Doriva Leonard, Hôpital Notre-Dame, Montreal; *Associate Secretaries* (Montreal Division), Dr. Herve Lacharité, Hôpital Ste-J.-d'Arc, (Quebec Division), Dr. M. Samson, Hôpital St-Michel-Archange, Quebec; *Associate Treasurer*—Dr. Léo-R. Payeur, Hôpital Hôtel-Dieu, Quebec. *Directors*—Drs. L. A. Gagnier, Sr., Hôpital St-Jean-de-Dieu, Montreal; J. Ed. Perron, Hôpital St-Sacrement, Quebec; Rosario Potvin, Hôpital Hôtel-Dieu, Quebec; J. E. Gendreau, Institut du Radium, Montreal.

Letters, Notes and Queries

Osler Warned!

To the Editor:

"What can a doctor say about immortality —especially with his wife and mother-in-law in the audience?" Thus Osler, when he was bullied by Welch and Eliot into giving the annual Ingersoll Lecture on the subject at Harvard in 1904. Though naturally inconclusive, his "Science and Immortality" was the best of the series from the literary point of view. Preferring, like Cicero, to be "wrong with Plato than right with those who deny altogether the life after death," he is claimed by the faithful as a survivalist. But it is something new to find him accused of being a resurrectionist—in the anatomical way. The subjoined threatening letter has just been found in his Library among the papers returned a few years ago by his biographer, Cushing. It is written (appropriately) on a bit of foolscap in a would-be copybook hand, and one suspects that it was misdirected. In 1880 Shepherd was still, I think, having to deal with the body-snatchers. Surely this was meant for him and McGill, not for Osler and the General Hospital?

It has a genuine look, though it might perhaps be a reprisal concocted by a victim of Osler's pranks. The punctuation and grammar are Long-seen's, not yours or mine!

W. W. FRANCIS.

Osler Library,
McGill University,
September 12, 1940.

"Montreal August 1880.

"Doctor Osler,

As You (in particular) and others imagine you distinguish yourselves in the presence of many who cannot help themselves, and count yourselves *clever* in your own conceit, I hint to you and them that (admitting reasonably, in the interest of science) if you and them continue in your custom of body-snatching, (I am sure it is such.) as you have been accustomed to, in the G.H.) *You* (especially, & others will find yourselves in need of the experience of science, or probably more for your personal comfort and existence,

(signed) LONG SEEN,
AND IN WAIT."

Answers to letters appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

The Effect on Bone of High Tension Electricity

To the Editor:

The undersigned is anxious to obtain information regarding the effect upon bone of lightning stroke or the passage of high tension electricity. There is reason to think that occasionally the passage of purely electric current through an extremity produces damage to bone which manifests itself by slowly progressive changes occurring over a long period of time; many years. If any of the readers of the *Journal* have had experience with such a condition, the result of lightning stroke or electric shock, perhaps they would be kind enough to write me details.

(Signed) R. I. Harris,
Orthopædic Service,
Toronto General Hospital.

Abstracts from Current Literature

Medicine

Méningite à Blastomycès. Nadeau, H.: *Laval Médical,* 1940, **5**: 364.

The author reports a case of meningitis due to blastomyces (*Torula gilchristi*) which occurred at the Saint-Sacrement Hospital, Quebec.

The patient was a man, aged 26 years, employed as a caretaker in a bank, who was sent to hospital on March 10, 1940, for a well marked meningitic syndrome. His family history was irrelevant. When two or three years old he suffered from rather frequent convulsive seizures for two or three months, which then disappeared.

In 1929 he was hospitalized for the first time because of two attacks of convulsions, two days apart, in the form of Jacksonian epilepsy. These attacks began in the right or left upper extremity and then became generalized. There was a complete loss of consciousness, followed by great lassitude, intense headache, nausea and vomiting. The only other evidence of disturbance was in the upper respiratory passages, apparently due to nasal obstruction from a deviated septum with chronic tonsillitis and enlarged tonsils. After treatment these manifestations and the convulsive seizures ceased, no more to appear.

About a year later he returned with the complaint of loss of appetite, severe headache, epigastric pain, and slight cough, but no expectoration. The buccal mucosa, the tongue, the tonsils, and the pharyngeal mucosa were sprinkled with grayish-white nodules like grains of wheat. In the lungs were indications of a slight active pulmonary congestion. The neck was stiff, and Kernig's sign was present. Babinski and Romberg signs were absent. The right Achilles reflex was also absent. Diagnosis was made by examination of the cerebrospinal fluid by culture and inoculation of mice. Microscopic examination of a nodule on the face gave an organism similar to that obtained on culture. Smears from the secretion of the mouth and throat revealed a mycelium resembling that of *Oidium albicans.*

Iodide of potassium was given in large doses. This resulted in improvement all round and apparent cure. Whether the improvement is permanent or transitory time only will tell.

A. G. NICHOLLS

Hygiène de l'enfance. Lapierre, G.: *L'Union Médicale du Canada,* 1940, **69**: 1040.

This is an address delivered by Prof. Lapierre to the students of the University of Montreal on the occasion of the official opening of the medical course this fall. It was designed to imbue the incoming medical students with a sense of their responsibility in regard to the care of children and the education of the public.

The lecturer emphasized the necessity, particularly in this time of stress, to improve the lot and so preserve the lives of our children. This was a task that would fall more and more into the province of the young physician in the near future.

Following his introductory remarks, Prof. Lapierre, after giving due credit to the advances that have already been made in the matter of public health and pædiatric care, remarked that much more remained to be done, and proceeded to outline some phrases of the subject that would repay attention. In the Ste. Justine Hospital, available to the students the facilities are second to none in Canada and the instruction is excellent.

Since 1920 the mortality of infants per thousand births has fallen by 76 per cent, and from respiratory diseases by 18.4 per cent. This is so far so good, but proper pre-natal care is still insufficient. We have to educate the parents in this matter. It was suggested that instruction of young women in schools and convents, in their senior years, on the subject of the care of children should be undertaken. Medical men can aid enormously in the movement by their enlightened interest. Poor housing is a notably harmful condition. The physician should endeavour to secure plenty of fresh air, sunlight, space, and the benefits of good hygiene generally for all the people.

The better instruction of pregnant and nursing women is essential. The "light of Nature", so often relied on is not enough. The best food for infants is mother's milk, despite criticisms that we sometimes hear in individual cases to the contrary. It is nearly always of sufficiently good quality.

All should be familiar with the scientific principles on which children should be reared, and also with the circumstances under which infectious diseases originate and develop. Physicians can do much to inform parents and teachers on these important matters. In spite of the progress that has already been made a more widespread scientific mentality is still desirable.

A. G. NICHOLLS

Congenital Atresia of the Œsophagus. Ealing, M. I.: *Brit. M. J.,* 1940, **2**: 83.

The clinical picture of congenital atresia of the œsophagus is uniform, resulting as it does from mechanical obstruction. In all probability the condition is under-diagnosed, particularly in cases occurring outside hospital practice. Diagnosis can easily be confirmed by radiographs, thus avoiding a wrong prognosis. Operative treatment does not appear likely to meet with great success, owing to the rapidity and ease with which pulmonary infection becomes established.

ROSS MITCHELL

Surgery

Splenectomy in the Treatment of Banti's Syndrome. Barg, C. H. and Durbin, J. W.: *Arch. Surg.*, 1940, **41**: 91.

These authors report a series of 43 patients with Banti's syndrome at the Iowa State University Hospital since 1922. Twenty-three of these were treated by splenectomy and the remainder conservatively. There was an operative mortality of 27 per cent. Hæmorrhage from the operative site accounted for 50 per cent of the mortalities. Duration of life was prolonged after splenectomy. Ascites was relieved and gastro-œsophageal hæmorrhages frequently continued or appeared for the first time after this operation.

The authors believe that splenectomy is the treatment of choice and should be performed in the early stages of the disease. The procedure may be contraindicated for elderly patients because of the high operative mortality. Three of the authors' patients were over 60 years of age and were greatly improved after operation. In their experience splenectomy for some inexplainable reason has relieved the patients of their ascites. Whether this is due to a lessening of the circulatory load through the liver has not been proved. Undoubtedly, an extensive collateral circulation is developed between the region of the splenic bed and the abdominal parietes. In general, patients with rapidly developing symptoms before operation respond poorly to splenectomy.

G. E. LEARMONTH

Fractures of the Tibial Plateau. Leadbetter, G. W. and Hand, F. H.: *J. Bone & Joint Surg.*, 1940, **22**: 559.

This is an excellent and constructive paper based on a study of 23 cases. The mechanism of the fracture production by forced abduction of the tibia on the femur in the extended position is outlined. The extent of the bony damage depends on the degree of the causative force. A simple split in the tibial plateau with detachment of a wedge, or a comminution of the whole tuberosity may be produced. Fracture of the neck of the fibula with peroneal palsy may occur in severe cases. The chief soft part injury is the laceration of the external meniscus, and this may be the key to the prolonged disability in cases treated by conservative measures. This disability may be a painful knee with effusion, instability, or genu valgum. Dr. Leadbetter advocates for this reason a more radical approach to the subject. Of the 23 cases 16 were exposed and the area examined; removal of the external meniscus was required in 12 cases. The crucial ligaments were intact in each case. The depressed bone was levered into position and in 4 cases of wedge fracture a screw fixation was employed.

The after-treatment consisted in plaster splintage from groins to toes for 4 to 6 weeks, followed by re-education of movements, but no weight-bearing for at least 12 weeks. Good results were obtained in 9 out of 16 cases treated by open operation.

H. F. MOSELEY

A Method of Fixation for Fracture of the Clavicle. Murray, G.: *J. Bone & Joint Surg.*, 1940, **22**: 616.

Dr. Murray describes a method for internal fixation of clavicular fractures. He expresses dissatisfaction with the anatomical and cosmetic results of such cases treated by external fixation, although no exact statistics are given. His method consists in the reduction of the fracture under general anæsthesia, by closed manipulation or, in difficult cases, by a lever introduced through a small incision over the site of fracture. A Kirschner wire is then introduced into the lumen of the sternal fragment and passed outwards. The wire automatically follows the cancellous tissue in the centre of the bone and thus secures the fragments. The wire is then cut short near the entry into the bone and the skin sutured. The wire can readily be removed later if necessary. Fluoroscopic films show that the wire adequately holds the fragments on all movements of the shoulder. Twenty-nine cases are quoted with good results and no infection or complications.

H. F. MOSELEY

Obstetrics and Gynæcology

Endometrioma Interstitiale. Goodall, J. R.: *J. Obst. & Gyn. of the Brit. Emp.*, 1940, **47**: 13.

Interstitial endometrioma is a disease in which the interstitial cells of the endometrium have taken on invasive growth beyond the boundaries of the endometrium. The author reports 14 cases, carefully studied, since 1928. Endometriomata are without normal function and have a minimum of differentiation. Two distinct clinical types appear. In the one there is a uniform symmetrical enlargement of the uterus due to ingrowth of endometrium and to stimulation of connective tissue and muscle. The endometrium is not necessarily thickened, but, if so, it usually shows a Swiss cheese or adenomatous pattern. In the chronic, slowly growing cases the uterus is not enlarged and looks macroscopically like a chronic metritis. In the rapidly growing cases the gross picture is typical, exhibiting swelling lymphatics filled with a pinkish-grey substance. Many of the author's cases described presented also a diffuse peritoneal or ovarian endometriosis.

The diagnosis of endometrioma can be confused with endometriosis, adenomyosis, and Recklinghausen's disease. Many histological patterns are shown. One must be careful not to confuse it with a sarcoma.

The author has had favourable results with operation and deep x-ray combined.

P. J. KEARNS

Chorion-epithelioma. Mahfouz, N. and Ismail, M.: *J. Obst. & Gyn. of the Brit. Emp.*, 1940, **47**: 1.

To those interested in obstetrical pathology this article is especially interesting because of the coloured representations which are very clear and demonstrative. There is a vast literature referred to. The authors state that the number of cases following normal abortions and labours at term is much less than that following hydatidiform mole. In their series of 15 cases of chorion-epithelioma, 8 were preceded by hydatidiform mole, 5 followed abortion, and 1 after full-term pregnancy. The early symptoms are sudden, irregular, uterine bleeding or serous brownish, sanguineous, discharge; wasting, weakness, pallor, anæmia, and cachexia. The Aschheim-Zondek test itself is not infallible. In all their cases the primary site of the tumour was in the uterus and in 5 cases the uterus reached the size of a 5 months' pregnancy. Bilateral cysts of the ovaries were present in 12 of the 15 cases.

Three of the patients died within the first three months. The prognosis is guarded; in no other case of malignancy do aberrant growths so frequently occur. Some cases are so extremely malignant that even after early, prompt removal, rapid dissemination of growth occurs, and fatally so, while, on the other hand, undoubted cases of complete recovery after simple curettage have been reported. P. J. KEARNS

Hydatidiform Mole and Chorion-Epithelioma. Brews, A.: *J. Obst. & Gyn. of the Brit. Emp.*, 1939, **46**: 813.

The author gives an interesting reference to the early history of hydatidiform mole, referring to Hippocrates' theories and to the supposed 365 children of the wife of Hennan, 1276.

He refers to personal experience giving clinical evidence of uterine hæmorrhage in 75 per cent of cases which followed a period of amenorrhœa of about 12 weeks. The uterus is usually larger than it should be for that period of amenorrhœa. The presence of signs of pregnancy toxæmia at an unusually early period of gestation is of significance. In 37 per cent of the cases examined albumin was found in the urine. Enlarged ovaries, showing increased luteinization, were a common finding. In 6 out of 11 cases the Aschheim-Zondek test was positive. X-ray of the uterus, to look for fetal parts, was employed in the more recent cases. Out of 792 patients delivering a hydatidiform mole, 17 developed secondary hæmorrhage; all showed recurrence of the disease after the diagnosis of chorion-epithelioma. Panhysterectomy is advised.

A nice coloured plate of metastases in the vagina occurring on the 41st day of the puerperium is shown.

The author refers to Blair-Bell's view that the etiology of cancer is wrapped up in the histology of the individual, supporting cell autonomy as opposed to the parasitic theory.

P. J. KEARNS

Pseudo-uterus Arcuatus and Functional Malformations of the Uterus. Rudolph, L.: *Am. J. Obst. & Gyn.*, 1940, **39**: 995.

The human uterus is a bilateral organ embryologically, anatomically and physiologically. The human uterus manifests bilateral synchronous and co-ordinated function. Some degree of inco-ordination of each half of the uterus is not infrequently present during pregnancy and labour.

Pseudo-uterus arcuatus is due to an inco-ordination of the two halves of the uterus. The true or anatomic type of uterus arcuatus can be definitely diagnosed only post-partum. Lateral obliquity of the uterus is due to an inco-ordination of the two halves of the uterus. Sacculation is due to a disturbance of a part of the upper or lower portion of each lateral half of the uterus. Irregular cervical dilatation is explained on the basis of the inco-ordination of the two lateral halves of the uterus.

The management of functional malformations of the uterus is intelligent expectancy.

ROSS MITCHELL

A Clinical Study of Stilbestrol. Davis, M. E.: *Am. J. Obst. & Gyn.*, 1940, **39**: 938.

Stilbestrol, a new synthetic œstrogen, unrelated to the natural œstrogens, has tremendous clinical possibilities. The oral administration of the drug can reproduce all the changes induced by the natural œstrogens much more effectively and to a greater degree. It replaces the œstrogenic action of the ovary. Many clinical conditions which are the result of a deficient ovarian activity or its complete cessation can now be easily and successfully treated. The treatment of the menopause and of primary amenorrhœa with stilbestrol is discussed in this paper. Other conditions under treatment at the present time will be discussed at a later date.

The widespread clinical use of stilbestrol must await more adequate evidence as to its possible toxicity. Pharmacological experiments involving the long-continued administration of moderate amounts of this drug must be carried out to determine late undesirable effects. Careful clinical observations must be continued with the most guarded approach until such time as the lack of toxicity of the drug can be firmly established. ROSS MITCHELL

Vitamin E and Habitual Abortion. Bacharach, A. L.: *Brit. M. J.*, 1940, **1**: 890.

For mice and rats the vitamin is essential for normal reproduction. In its absence certain species—rat, guinea-pig, rabbit and dog—have

been shown to develop a characteristic muscular dystrophy. Its successful use in the veterinary treatment of cows and sows has been claimed, particularly by Vogt-Möller. There seems little doubt that it is needed for normal production and hatchability of hen's eggs. Certain American workers claim, however, that its absence does not prevent normal pregnancy in the goat, the sheep and the rabbit. There can therefore be no conclusion on general grounds as to its indispensability to the human species, but it is suggested that the analysis given in this paper affords at least presumptive evidence that it is needed for normal pregnancy in women.

ROSS MITCHELL

Chemotherapy of Gonococcal Infections in Women and Children. Moffett, M.: *Brit. M. J.*, 1940, **2**: 8.

In the treatment of gonorrhœa in the adult female the administration of sulfapyridine is a great advance on the older methods. In the present series 87.4 per cent of the cases were cured in a very much shorter period than was previously possible. In children suffering from vulvo-vaginitis the results are less encouraging. With the dosage used the ill effects of the drug are infrequent and of no great severity. In the treatment of complications of the infection in adults no measures other than the administration of sulfapyridine are necessary. No failures have occurred in the treatment of gonococcal ophthalmia with sulfapyridine. ROSS MITCHELL

Pregnancy Pyelonephritis in Relation to Renal Damage and Hypertension. Crabtree, E. G. and Reid, D. E.: *Am. J. Obst. & Gyn.*, 1940, **40**: 17.

In a survey of 45 patients with pyelonephritis associated with pregnancy evidence indicates that a high percentage of patients suffer appreciable damage to their kidneys which is demonstrable at from five to fifteen years after the infection. For the majority, adequate renal function is present at the time of infection. The prognosis is grave when there is both toxæmic and pyelonephritic injury. Hypertension was found in all the patients where there had been both toxæmia and pyelonephritis (3 cases). Two of the three were dead at 5 years after the injury. Six patients with pyelonephritis showed blood pressure readings above 150/90, associated with some evidence of renal deficiency at that stage of the disease.

Renal injury consisted of injury both to pelvis and ureter and to the cortex. When there is injury to the conducting channels the stasis of urine produced by this condition may further injure the cortex. Stone occurred in 5 of the 45 patients studied. Evidence of total renal deficiency was present at the time of examination in some proved unilateral cases. This finding suggested some injury other than bacterial invasion for the second kidney.

Pyelonephritis of pregnancy should be looked upon as a progressive disease in many cases. Data have not yet been produced as to what extent it shortens life. Sufficient evidence has been produced to indicate that the aim in treatment in pyelonephritis associated with pregnancy should be to minimize the initial injury and clear the infection as soon as possible.

ROSS MITCHELL

Pathology and Experimental Medicine

Studies on the Time Required for the Elimination of Quinidine from the Heart and Other Organs. Weisman, S. A.: *Am. Heart J.*, 1940, **20**: 21.

Using dogs in a series of well controlled experiments, the author demonstrates the relatively rapid rate of elimination of quinidine. Method for the quantitative determination of quinidine sulphate in tissues and blood is set forth, the tissues studied being the heart muscle, liver, lungs, spleen, kidneys, diaphragm and skeletal muscle (gastrocnemius).

The drug was given orally and it was found that a single small dose reached its maximum concentration in the heart muscle in about thirty minutes, and no trace was found at the end of four hours, while a single large dose reached its maximum concentration in about one hour, and no trace remained after seven hours in the heart muscle. Repeated small doses produced a maximum concentration in the heart in about one hour when only two doses were given, and in about two hours when three and four doses were given one hour apart.

While a single large dose produced a maximum concentration in the heart muscle in about one hour, and was eliminated in about seven hours, the same amount given in three divided doses at hourly intervals produced the maximum concentration in about two hours, attaining a concentration of not more than 50 per cent of that produced by a single dose, and being eliminated in about eight hours.

It was found that the more active muscles absorbed the most quinidine, the heart taking up twice as much as the diaphragm, and the diaphragm twice as much as the gastrocnemius.

The work outlined in this article would seem to substantiate the rationale of the present tendency to give quinidine in frequent divided doses, rather than three times daily, or less frequently, as was the custom not so long ago.

W. H. HATFIELD

Familial Lumbo-sacral Syringomyelia. Van Epps, C. and Kerr, H. D.: *Radiol.*, 1940, **35**: 160.

These authors report a series of cases of trophic ulcer of the feet, coming on for the most part in the teens, and accompanied by

lack of healing, discharge of pieces of the bone through the ulcer, and lack of pain. Of five patients only one appeared to have no relatives affected. In the first family, the grandmother, two sons, and two daughters were affected, and three daughters normal. One affected son had three sons with one of them affected; and one affected daughter had one son affected and one son and three daughters normal. In the second family there were in the first generation two sons, one of whom was affected, and five normal sisters. One sister had an affected son, and an affected grandson by her normal daughter. A second sister had an affected son and an affected grandson by a normal child. A third sister had an affected grandson by a normal son. The unaffected son had a great-grandson affected. Here the line of descent is not so direct as in the first and third families. The third family had an affected grandfather, 4 of his 7 children, and 5 of his 17 grandchildren affected. The five in the third generation were offspring of three of the affected members in the second generation, thus carrying out the rule that affected parents are likely to have some of their children affected, and normal parents are not likely to have affected offspring. In the fourth family of 12 children, 3 had died in infancy, and of the 9 living to maturity 2 sisters developed the condition. That four of five patients should have such extensive family histories shows that the disease has a definite genetic basis.

MADGE THURLOW MACKLIN

Regarding the Effects of Desoxy-corticosterone and of Testosterone on the Adrenal X Zone. Howard, E.: *Anatomical Record,* 1940, **77**: 181.

Female mice were daily injected intraperitoneally with 0.05 to 0.5 mg., in 0.05 c.c. corn oil, of either "D" (desoxy-corticosterone acetate) or "T" (testosterone proprionate), and the adrenal pictures compared with one another after 14 days (D) and 6 to 10 days (T), and with that of a control. T caused marked degeneration of the X zone, which in these mice amounted to about one-third of the cortex, whereas D induced no appreciable change. In 2 mice, castrated on the 4th day and at the same time given pellets of D subcutaneously, the X zone, at 19 days, was clearly differentiated, of normal size relative to the permanent cortex, and did not appear to have undergone any greater inhibition than the cortex as a whole, when compared with 2 castrated control mice. The conclusion is drawn that this difference in X zone response and other accordant considerations suggest that the X zone is not functionally equivalent to the permanent cortex.

C. C. MACKLIN

Hygiene and Public Health

Range of Normal Blood Pressure and Subsequent Development of Hypertension. Hines, E. A.: *J. Am. M. Ass.*, 1940, **115**: 271.

This is a study of 1,522 patients followed for 10 or 20 years at the Mayo Clinic. Seven hundred and ninety had their first blood pressure reading in 1916, 732 in 1926; 20 and 10 years later, respectively, blood pressure readings were again taken. The original blood pressure readings were taken at the time of first admission and may have been influenced by nervous or emotional stress at the time. However, the evidence of this study seems clear that, whatever the cause, an elevation of blood pressure, particularly of diastolic pressure is apt to be followed in subsequent years by a hypertensive state. The negative statement is perhaps more significant; patients whose blood pressures are not elevated as a result of nervous stress to more than 140 mm. systolic and/or 85 mm. diastolic are unlikely to develop hypertension subsequently.

The following table gives the evidence upon which these conclusions are based.

TEN YEAR GROUP

Original readings mm. Hg.	*Cases*	*Subsequent hypertension*	
		Cases	*Percentage*
	Systolic pressures		
Below 110	76	0	0
110-119	194	4	2.1
120-129	212	13	6.1
130-139	103	11	10.7
140-149	86	34	39.5
150-160	61	37	60.7
	Diastolic pressures		
Below 70	88	0	0
70- 74	146	5	3.4
75- 79	83	2	2.4
80- 84	225	5	2.2
85- 89	48	12	25.0
90- 94	85	35	41.2
95-100	57	40	70.2

TWENTY YEAR GROUP

	Systolic pressures		
Below 110	77	0	0
110-119	184	9	4.9
120-129	239	30	12.6
130-139	142	48	33.8
140-149	111	70	63.1
150-160	37	29	78.4
	Diastolic pressures		
Belwo 70	110	0	0
70- 74	144	2	1.4
75- 79	93	4	4.3
80- 84	187	13	7.0
85- 89	110	63	57.3
90- 94	103	67	65.0
95-100	43	37	86.0

FRANK G. PEDLEY

Hypertension and Obesity, A Statistical and Clinical Study of 10,883 Individuals. Robinson, S. C., Brucer, M. and Mass, J.: *J. Lab. & Clin. Med.*, 1940, **25**: 807.

The authors present a statistical study of the relationship between weight and hypertension. Their source material was gathered mainly from the records of the former Life Extension Institute, Chicago, the West Side Y.W.C.A., Chicago, and the Student Health Service of the University of Chicago. Altogether 10,883 individual records are analyzed, of which 7,478 were of males and 3,405 of females. Since weight alone is no indication of obesity they use the "ponderal index" (weight in pounds divided by height in inches). With this index under 2.0 is considered lightweight, 2.0 to 2.4 medium weight and over 2.4 heavyweight.

They state (quoting from authorities) that man normally increases in weight up to age 25, after that time weight should stay stationary. This is true of primitive people and of physically active people such as farmers, but in persons whose occupation is sedentary it often happens that weight steadily increases during life. After thirty increase in weight is considered a pathological process. Life-insurance statistics indicate a definite hazard to life from over-weight in all age-groups over forty.

In their study the authors find a definite and significant relationship between over-weight and high blood pressure which may be expressed in various ways. Taking either the mean or the mode of the group, both the systolic and diastolic pressure increased with the increase in the ponderal index. Obese males have almost 3 times more systolic hypertension, and almost 4½ times more diastolic hypertension than do under-weight males. Obese females have 6 times more systolic and diastolic hypertension than do under-weight females. Among under-weight males there are 2½ more low systolic pressures than high systolic pressures, whereas among obese males high systolic pressures are 2½ times more common than low. The increase of blood pressure with the increase in ponderal index applies to practically every age-group in both sexes.

FRANK G. PEDLEY

Jaundice in Detroit. Molner, J. G. and Meyer, K. F.: *Am. J. Public Health*, 1940, **30**: 509.

This is an epidemiological study of 194 cases of jaundice occurring almost in epidemic form in Detroit from November, 1938, to June, 1939. These cases were considered definitely not to be Weil's disease, since all except four gave negative agglutination reactions. Of the 4 three reacted to *Leptospira icterohæmorrhagica* and one to *B. paratyphosus B.* The three reactors to the Weil antigen may be considered cases of true spirochætal jaundice. The others are probably of the type which have been described from time to time as occurring in epidemic form. The cause of this type of jaundice is quite possibly an infectious agent, the nature of which is not known.

Perhaps the most important epidemiological feature of the study was the establishment of direct contact for 113 of the 194 cases (58.3 per cent). The largest number of these contact cases appeared to have an incubation period of 2 to 3 weeks. Food, water and other possible vehicles of infection were considered not to be factors in the spread of the disease. The average length of time from the onset of the disease to the appearance of the jaundice was 7 days. The average duration of the disease was 15 days. Several families had multiple cases (40, of 144 families). The geographic location of the cases did not suggest any common focus. Fifty-seven schools were involved.

FRANK G. PEDLEY

A Study of the Rôle of Ventilating Systems in the Transmission of Bacteria. DallaValle, J. M. and Hollaender, A.: *Pub. Health Rep.*, 1940, **55**: 1268.

In recent years interest has been revived, largely through the work of Wells, in the possibility of the spread of infection through the air. If air-borne infection is of common occurrence then modern ventilating systems, which re-circulate a high proportion of air, may actually prove agents in the spread of disease.

The paper under review is the report of tests made with two ventilating system, using *B. subtilis* spores as indices of air-infection. The spores were introduced at various points in each system by means of a spray gun, and samples were taken in representative rooms. Spores were recovered from the ventilating systems after spraying, even when the sprayed air had passed through the filters provided. The concentration of the spores dropped rapidly, however, after spraying had ceased.

FRANK G. PEDLEY

QUINTUPLETS.—A record of a premature delivery. In the *British Medical Journal*, 1940, **1**: 127, a descriptive account is given by Mr. Rau and Drs. Aiyar and Mathew of a quintuplet birth. The "Quints" were born to a Hindu multiparous woman (six-para) about 30 years of age, belonging to the lower middle classes at Tuni, a town in the East Godavari district of the Madras province, in July, 1939. She seems to have sought admission in the hospital for women and children at Tuni for an unusually big abdominal tumour. The case was presumably diagnosed as pregnancy complicated by polyhydramnios. Premature delivery occurred during the sixth month. The specimen was suitably mounted and exhibited in the museum of the department of anatomy, Medical College, Vizagapatam. The "Quints" were all females, having five separate umbilical cords attached to a single fairly large placenta. The quintuplets were probably of identical or uniovular nature.

Obituaries

Dr. Alexander Ross Alguire, of Cornwall, Ont., died on August 29, 1940. He was born in 1885 and a graduate of McGill University (1905).

Dr. William Bruce Almon, of Halifax, N.S., died on September 11, 1940, after an illness of several months. He was born on April 26, 1875, in Dufferin, Man., the only son of Cotton Mather and Ellen Susanna Almon. Owing to his father's ill-health the family moved to Ottawa, and later, for a short time, lived at Rosebank, Halifax, the home of his grandfather, the Honourable William J. Almon, M.D., for many years a member of the Senate. In Halifax Dr. Almon attended the Morris Street School, but his early education was received principally in the Ottawa Collegiate Institute.

In 1889 he came to King's Collegiate School, Windsor, whence he graduated with honours into King's College, taking an engineering course at that University, though he did not proceed to a degree. It was a great joy to the lad when his grandfather, who had undertaken his education and who had not thought the medical profession could maintain two Almons, realizing that the sons of his doctor son had no inclination to follow the family profession, offered him a medical education. He was a graduate of the old Halifax Medical School and took his degree from Dalhousie University in 1899, proceeding at once to Paris, for a post-graduate course. He opened his office at 166 Hollis Street, where his grandfather had had his surgery before him, and was soon appointed to the Halifax Dispensary outside staff where the late Drs. Forrest and Doyle were associated with him, and in his very poor district was able to get a great deal of practice, though the pay (was it $150 a year?) was not large. He was thus at the time of his death the oldest member of the Dispensary staff, though no longer on its active list. In his first or second year of practice he became assistant demonstrator in Anatomy, under Dr. Lindsay, of much fame in the Maritimes, and upon a vacancy occurring in the obstetrical department of the University, realized his ambition in becoming a lecturer in that branch of medicine.

Dr. Almon was appointed City Medical Officer in 1913, thus becoming, *inter alia*, physician at the City Home, formerly the Poor's Asylum, a position his great-grandfather and grandfather had held before him. At the time of a severe illness in 1923, the *Nova Scotia Medical Bulletin*, expressing its sympathy with the City Medical Officer, added, "We see that a Dr. William Bruce Almon was City Medical Officer in 1823, is the position congenital or acquired?"

The City Home maternity ward soon became his pride; he never lost a mother there notwithstanding the hard cases which were under his care,—except a little woman with a very sad story who willed to die rather than live in her shame. It was a real grief to Dr. Almon when the Grace Maternity Hospital offered to take care of all City cases, in return for a City grant. He had resigned from the Salvation Army Rescue Home, of which he had sole charge a few years before, so that, his maternity hospital work being closed to him, he specialized in his Hospital for Infectious Diseases, which was also a model institution, thanks to his efficient and co-operating staff.

During the first World War, unable to go overseas with the Dalhousie Unit for family reasons, he served at the Rockhead Hospital and at Camp Hill for the duration of the War. Because his having to stay at home was such a disappointment to him, he would never allow that his services in the C.A.M.C., valuable as they were, were real "war" work. The Halifax explosion saw the wreck of his hospital at Rockhead and the maiming of several of his staff.

Dr. Almon was a wonderful diagnostician, with an almost unerring instinct for sizing-up a case. In his earlier work this was a gift of great value; today, with so many mechanical means for diagnosing, this, once the sign of a good physician, is being sadly neglected—no loss when the mechanical means are at hand, perhaps, but one is not always next-door to a well-equipped hospital.

The first Doctor Almon came to Halifax with the United Empire Loyalists from New York in 1777; he died in Bath at the age of 65 of the same complaint, coronary thrombosis, as our own doctor. Another William Bruce Almon, M.D., was a member of the Nova Scotia Council. Our subject's great-grandfathers on his mother's side were, respectively, the first (Richard Gibbons) and the last (Hon. Charles Archibald Dodd) Chief Justices of the Island of Cape Breton. Dr. Bruce Almon in his youth also took an active interest in politics, being a strong Tory with inherited instincts for the strengthening of Imperial ties between not only the Motherland and Canada but also throughout the Empire. Realizing that politics and medicine don't mix well, unless there is a golden syrup flowing around, he had to give up active political work, but never ceased to have an interest in the political life of the country.

Dr. Almon was beloved by all who knew him for his kindliness, and admired for the store of knowledge, medical and general, he possessed. His tastes were simple, he loved flowers, was an ardent fisherman, though no lover of the country. A "clubable man" he enjoyed his game of bridge at the Halifax Club, of whose Committee he had been a member for many years. Gentle, sympathetic, and kindly, his gentleness was not weakness. Perhaps had he been more self-assertive he would have died a rich man, but would he have died more well-beloved?

"In feature and in mien, with all good grace, a gentleman."

Dr. Ovila Birs, of Coaticook, Que., died on September 20, 1940. He was born in 1881 and a graduate of Laval University Medical School, Montreal (1907).

Colonel Hugh Alexander Chisholm, C.M.G., D.S.O., of Halifax, N.S., who played a leading rôle in civil and military life of Nova Scotia, died on September 25, 1940. He was born in 1883.

A native of Cambridge, Mass., Col. Chisholm moved to Linwood, N.S., early in life. He was educated at St. Francis Xavier and McGill Universities (M.D., C.M., 1905) and joined the Army Medical Corps in 1910. He served overseas during the first Great War with distinction.

Col. Chisholm returned to Canada in 1920 and became inspector of health for Nova Scotia, a post he held until 1928 when he entered the Department of Pensions and National Health. Later, he was Port Physician in Halifax until his retirement last year.

Lieut.-Col. François X. L. deMartigny, M.D., of Montreal, one of the founders and former chief surgeon of the Jeanne d'Arc Hospital, Montreal, and former president of the Quebec branch of the Canadian Legion, died on September 28, 1940.

He had an international reputation as a surgeon and was recognized for many years as one of the leading figures in the medical profession in Canada.

Born at St. Romuald, Que., in 1872, he was educated at the College de Levis, and later at the Jesuits' College and at Laval University Medical School, Montreal, where he obtained his doctor's degree (1893).

After graduation he spent eight years in Paris in pursuit of special studies, acting as intern at the International Hospital and later as assistant surgeon at another hospital there. Returning to Montreal, he was attached for a time to the Hotel Dieu before he joined in the movement to found the Jeanne d'Arc Hospital.

He became chief surgeon at the Jeanne d'Arc Hospital, a position he held until two years ago when he retired.

He was a member of the Société Nationale de Chirurgiens de Paris, of the French Association of

Surgeons, of the International Association of Urology, and of the Société Française d'Urologie.

During the Great War he was attached to the Woolwich Hospital and Richborough Line Hospital, and was later chief surgeon at the Canadian Hospital at St. Cloud near Paris. He was also attached for a time to the Carrel hospital at Compiegne.

He was decorated by the French Government for his efforts to give public instruction, and received a gold medal for devotion to duty.

Dr. Frank Algan Duston, of St. Stephen, N.B., died on September 12, 1940. For many years Dr. Duston was one of the best known physicians practising on the New Brunswick-Maine border. He was born in 1878 and was educated in the public schools of St. Stephen and at the University of New Brunswick. He received his medical degree from Harvard Medical School (1911).

Dr. John Ephraim Elliott, of Toronto, died on September 27, 1940. He was 81 years of age, and a graduate of Victoria University (1884). He had served as house physician for the King Edward Hotel since the opening in 1903, and was physician for the Ontario Jockey Club for many years, as well as for a number of insurance and other companies. For fifty-six continuous years Dr. Elliott had practised medicine in Toronto. He was a member of the old Toronto General Hospital staff and was one of the founders of the Canadian Red Cross.

Dr. Elliott was born in Centralia, Huron County. He received his early education in Kingston schools. He was physician to the North West Mounted Police in the early days of the force and had served on the staff of the Boys' Home and the Hospital for Incurables.

A medical officer of the old 9th Toronto Field Battery, he held the rank of major, and in 1902 was gazetted a colonel of the Second Brigade Canadian Field Artillery, of which he was medical officer. He held the Colonial Officers' long service medal.

Dr. Elliott was chairman of the Toronto Collegiate Institute Board when it served as a separate body and worked for the amalgamation of this board with the Toronto Public School Board. For many years he was president of the Toronto Young Men's Liberal Association.

In 1914-1015, Dr. Elliott was chief medical examining officer for recruits for Toronto Military District.

Dr. Victoria Ernst died at her home in Bridgewater, N.S., on October 4, 1940. She was eighty-five years of age. Dr. Ernst had taught in the schools of Lunenburg County for almost twenty years when she became interested in medicine. Coming to Dalhousie, she graduated from the Halifax Medical College in 1900. She returned to Bridgewater and practised gynæcology for twelve years before retiring and becoming interested in real state, which occupied her time till a few weeks before her death.

Dr. Alexander Neil Macleod, of Winnipeg, died on October 11, 1940, at the age of 73. Born in Kildonan of pioneer stock, his father having been a factor of the Hudson's Bay Company, he was educated in Winnipeg and graduated in Arts from Manitoba University and in Medicine from the Manitoba Medical School (1893). He practised for thirty years in Stonewall and for fifteen years in Winnipeg. For several years he was secretary of the Faculty of Medicine, University of Manitoba, and assistant provincial coroner.

Dr. MacLeod is survived by his widow who is an authority on the early history of the Canadian West and by two daughters.

His son, Alan MacLeod, won the Victoria Cross in the last war at the age of nineteen, but died of influenza shortly after the armistice.

Dr. Charles Gilliland Main, of Saint John, N.B., died on September 7, 1940. He was born at St. Andrews, Charlotte County, on January 2, 1865, the son of William Main, a native of Whithorne, Scotland, and Margaret Alderly, of St. Andrews. After completing his high school course at the St. Andrews Grammar School he continued his studies at McGill University and took his doctor's degree in medicine there (1891). After graduating he opened his medical practice at Edmundston, N.B., and took an active part in various community endeavours. In addition to participating in municipal and fraternal work he was a member of the school board for several terms.

In 1910, Dr. Main moved to St. Stephen where he practised his profession until the outbreak of the Great War. He served overseas as a captain with the Canadian Army Medical Corps and was attached to No. 3, Canadian General McGill Hospital in France from 1916 until the end of the war.

Dr. Main took up residence in West Saint John in 1927 when he purchased the home of Dr. F. L. Kenny and took over Dr. Kenny's practice.

Dr. Donald McKay, of Collingwood, Ont., died on September 28, 1940. He was born in 1886 and a graduate of the University of Toronto (1889).

Dr. Alexander Moir, of Hensall, Ont., died on September 12, 1940. He was born in 1874, in Hay Township, the son of Mr. and Mrs. George Moir. He was a graduate of the University of Manitoba (1906).

News Items

Alberta

Alberta has closed a summer season that has been remarkably good from the standpoint of public health. Up to August 31st only 3 cases of typhoid fever and 2 cases of paratyphoid fever were reported in this province. The improvement that has taken place during the last thirty years is evidenced by the fact that it was not uncommon thirty years ago to have up to 1,000 cases of typhoid fever reported in a single year with up to 200 deaths occurring from this cause. While the improvement has been a remarkable one it is still necessary to be on the guard against typhoid fever, to make certain that the water supply and the milk supply in any community are safe for human consumption. A typhoid fever carrier is still a serious menace and may at any time be responsible for a local outbreak of the disease where such a carrier has anything to do with the handling of foodstuffs or milk.

Cases of infantile paralysis were practically non-existent, only one suspected case being reported.

A preliminary report received by the Provincial Department of Health from the Bureau of Statistics at Ottawa, dealing with the vital statistics for 1939, shows that last year Alberta had the lowest infantile mortality rate in its history. This rate, based on the deaths of children under one year of age per 1,000 living births, was 46 for 1939, compared with 51 for 1938, and 63 for 1937. The Alberta rate of 46 for 1939 was the second lowest in the Dominion of Canada. Thirty years ago the infantile mortality rate in Alberta was approximately 120. Thus, the rate for 1939 was only about one-third of that of thirty years ago. The reduction in the infantile death rate has been effected through the application of modern public health measures, the safe-guarding of water and milk supplies, the protection of children from intestinal and other infections, improved sanitation, and the education of the public in regard to child hygiene.

In 1939, Alberta also had the lowest death rate in its history of children under one month of age. Practically 50 per cent of the deaths of infants under one year of age occur during the first month of life. The Alberta rate for this age-group for 1939 was 23 per

1,000 births, compared with 27 in 1938 and 31 in 1937. There is still room for improvement in our infantile mortality rate, particularly in deaths occurring in early infancy and in deaths due to intestinal and respiratory infections.

It is noteworthy that the infantile death rate in rural areas and small towns and villages in which modern full-time preventive health services are not available is 50 per cent higher than in cities and established health units providing such full-time public health services.

G. E. LEARMONTH

British Columbia

The Medical Services Association has begun operations in British Columbia, and has acquired offices of its own. It is enrolling members, both lay and professional. Services commence on November 1, 1940, and considerable interest is being shown by lay groups. The terms of service and the details of organization have been approved by the Committee on Economics of the College of Physicians and Surgeons. Medical men enrol as professional members and have representation on the Board of Management. The Medical Services Association will extend services as early as possible to all parts of the province. Dr. S. Cameron MacEwen is the Director of Medical Services.

We regret to report the loss of a member of the Victoria Medical Society in the passing of Lt.-Col. J. A. Murray, R.C.A.M.C. Lt.-Col. Murray was District Medical Officer in Victoria until his retirement a short time ago on account of ill health.

J. H. MACDERMOT

Manitoba

Winnipeg relief rolls dropped to the low point in 10 years at the end of August. The monthly statement of the public welfare department showed 2,389 families, 872 single men and 985 women on public welfare. The city's share of relief costs to the end of August totalled $562,965 compared with $782,035 for the same period in 1939.

Dr. Gerard Normandeau, Lorette, Dr. Joseph Portnuff, Churchill, and Dr. R. M. Creighton, Oak River, have been appointed coroners for the province.

Dr. E. W. Montgomery, Winnipeg, chairman of the provincial board of health, has been re-appointed for a further three-year term as from April 1st. Other members re-appointed are: Dr. M. S. Lougheed, Winnipeg; Dr. J. S. Matheson, Brandon; Dr. G. W. Rogers, Dauphin; E. W. J. Hague, Winnipeg; Frank Simmons, East Kildonan; G. L. Stoney, Morris; and R. M. Fisher, K.C., Winnipeg, Secretary.

Dr. T. E. Holland has been promoted to the rank of Lieut.-Colonel in the Canadian Army Medical Corps, C.A.S.F., and will be in command of Fort Osborne Military Hospital, Winnipeg.

Dr. Miklos Galambos has begun practice at Beausejour in succession to Dr. W. G. Riddell who has left for Ottawa to join the Medical Corps of the R.C.A.F.

ROSS MITCHELL

New Brunswick

Dr. R. J. Collins, Superintendent of the Saint John Tuberculosis Hospital, was recently elected president of the Saint John Branch of the Canadian Institute of International Affairs.

Lt.-Col. R. A. Hughes, until recently D.M.O., M.D. No. 7, at Saint John, N.B., has been transferred to a similar position in Western Canada.

Dr. D. J. Tonning, who for some time has practised at Black's Harbor, N.B., is now established in Saint John, and has received an appointment to the medical staff of the Saint John General Hospital.

Dr. C. E. Dumont, Campbellton, N.B., was elected Vice-president of the Congress of French Language Doctors of North America at the meeting in Three Rivers, in September.

Dr. Charles G. Main, of Saint John, died recently at his home in West Saint John. Dr. Main graduated from McGill University in 1891 and had practised at several points of the province of New Brunswick. He served with distinction in the World War of 1914-1918. He was associated for many years with the British Empire Service League.

Friends of Lt.-Col. A. B. Walter were shocked to hear of the sudden death of his son, Lieut. Robert Walter, in a hunting accident recently.

Lt.-Col. R. M. Pendrigh has returned with No. 14 Field Ambulance after a long convalescence necessitated by an injury this spring.

A. S. KIRKLAND

Nova Scotia

Truro is being considered as a site for a 200 bed Red Cross convalescent hospital. A Truro citizen, Mr. Herbert A. Johnson has offered to contribute a property which it is believed would be a suitable site.

Dr. John Alexander Webster (Dal. '38), now practising in Yarmouth, after post-graduate work at Cleveland, has high, well established precedents to follow. His father, grandfather and great-grandfather Webster all have practised in Yarmouth before him.

Dr. Allan R. Morton, D.P.H., has been appointed City Medical, Health and Welfare Officer for Halifax.

Annual medical examinations of Dalhousie students have been modified this year to conform with Army Medical Board standards. Students are categorized according to army groups.

Dr. William Hallett Cole (Bowdoin College, 1883) was honoured recently on his eighty-fifth birthday. Dr. Cole was born in Caledonia, N.S., in 1855. He has been one of the pioneer physicians of Lunenburg county and still has his office in New Germany.

Lt.-Col. R. H. Sutherland, R.C.A.M.C., of Pictou, N.S., has been appointed to command of the Military Hospital at Halifax.

Dr. H. F. Sutherland, town medical health officer, Glace Bay, was granted leave of absence on joining the militia. His place has been taken by Dr. J. M. Peters.

Dr. F. F. Chute, Canning, has been appointed a member of the Canadian Pensions Commission.

Construction of a new wing to the Glace Bay General Hospital, postponed because of a war slump in hospital securities, will begin again if subscribers agree to add five cents weekly to their subscription rates.

ARTHUR L. MURPHY

Quebec

Brigadier-General H. S. Birkett, of Montreal, has been honoured by Ottawa, being appointed Honorary Colonel in the R.C.A.M.C.

Dr. G. F. Stephens, the new superintendent of the Royal Victoria Hospital, Montreal, is now in the city and has assumed his duties. He was formerly Medical

Superintendent of the Winnipeg General Hospital, where he was very successful.

Doctor Stephens was entertained on September 27th at the Ritz-Carlton Hotel and was the recipient of a presentation. Sir Edward Beatty gave the presentation address. He, together with Principal F. Cyril James, of McGill University, and Dr. W. W. Chipman, represented the Board of Governors of the Hospital. Dr. J. C. Meakins, chairman of the medical board, presided.

Dr. Jean Gregoire was elected president of the Canadian Public Health Association at its annual meeting, held recently in Winnipeg.

The winners of the contest to determine which health units had obtained the best results in the preservation of public health in rural districts were the following: Saint Jacques-Saint Vital, Manitoba; Saint Jerome-Terrebonne, P.Q.; High River, Alberta; Nicolet, P.Q., and Laviolette-Grand'Mère, P.Q. The health unit of Saint Jean d'Iberville-Laprairie-Napierville was given special mention as, once again, it ranked ahead of all other health units in Canada. It had been awarded first prize in two previous contests.

In the latest issue of the Health Bulletin, issued by the City of Montreal it appears that the death rate from tuberculosis in the Province of Quebec is not to be boasted about. In particular, Montreal's rate has always been higher than Toronto's. Quebec led all the other provinces in this matter during the years 1936, 1937, and 1938.

In 1936, Montreal had a death rate of 85.3 per 100,000 while Toronto reported only 42.6. The all-Canadian rate was 61.4. In the following year, Montreal led with 82 and Toronto reported only 36.9 deaths per 100,000 while the Dominion rate was 59.9. In 1938, Montreal's rate had dropped to 74.8 while Toronto's showed a slight increase to 37.4. The Dominion rate had eased down to 54.7.

While the Montreal figure dropped to 70.1 for the past year, Toronto's showed a greater decline with only 27.9 deaths per 100,000. The average for the 1936-37-38 period was 76.7 for Montreal, 39 for Toronto and 58.6 for all Canada.

A comparative table for the 3-year period for different provinces follows:

Province	1936	1937	1938	*Average*
Quebec	93.3	88.3	82.7	88.1
Prince Edward Island.	66.3	69.9	86.2	74.1
New Brunswick	82.1	87.0	76.6	81.9
Nova Scotia	89.1	84.3	75.2	82.8
British Columbia	74.8	79.9	70.3	75.0
Manitoba	59.1	59.4	48.5	55.6
Alberta	49.4	43.6	35.8	42.9
Ontario	36.0	35.4	33.2	34.8
Saskatchewan	29.8	31.5	28.8	29.9

A Medical Directory for the Province of Quebec has just been issued by The Quality Press Limited, Montreal. It is in both English and French. The list of physicians practising in the Province can be taken as authoritative as it is that of the College of Physicians and Surgeons of the Province of Quebec. A glance at the table of contents shows that the work is very comprehensive. Valuable information is given about the activities of the Provincial College, the Department of Health, Schools of Medicine in the Province, medical societies, the hospitals, and the Association of Registered Nurses, county Sanitary Units; lists of prison physicians and coroners; medical publications—the whole in compact and convenient form.

This work is welcome and is practically indispensable for the majority of practising physicians and surgeons.

Saskatchewan

The annual medical convention of the Saskatchewan College of Physicians and Surgeons was held in the Bessborough Hotel, Saskatoon, on September 16, 17, 18, 1940.

After the business meeting the following program took place: Dr. J. H. Couch, Toronto, "The age factor in appendicitis" (motion pictures); Dr. Harold Wookey, Toronto, "Surgical aspects of oral cancer"; Dr. Walter deM. Scriver, F.R.C.P.(C.), Lecturer in Medicine and Therapeutics, McGill University, Montreal, "Anuria—a present day medical problem"; Dr. Duncan Graham, President, Canadian Medical Association, Toronto, "Sulfanilamide and related compounds in the treatment of infections"; Dr. Walter deM. Scriver, Montreal, "Diabetes as a quantitative disease"; Dr. Harold Wookey, Toronto, "Recent progress in the surgical treatment of cancer"; Dr. J. H. Couch, Toronto, "Recent advances in fractures" (motion pictures): (*a*) principles of first aid; (*b*) use of local anæsthetic; (*c*) ambulatory treatment of fractures; (*d*) skeletal fixation. The luncheon speakers were Dr. T. C. Routley, General Secretary, Canadian Medical Association and Dr. J. S. Thomson, President, University of Saskatchewan. The guests were taken on a tour of inspection of the Air-Training Centre by the board of trade. A banquet and dance were given by the Saskatoon Medical Society and very much enjoyed.

LILLIAN A. CHASE

United States

Finney-Howell Research Foundation, Inc. — Announcement has been made by the Finney-Howell Research Foundation, Inc., that all applications for fellowships for next year must be filed in the office of the Foundation, 1211 Cathedral Street, Baltimore, M., by January 1, 1941. Applications received after that date cannot be considered for 1941 awards, which will be made March 1, 1941.

This Foundation was provided for in the will of the late Dr. George Walker, of Baltimore, for the support of "research work into the cause or causes and treatment of cancer".

Fellowships carrying an annual stipend of $2,000 are awarded for the period of one year, with the possibility of renewal up to three years; when deemed wise by the Board of Directors, special grants of limited sums may be made to support the work carried on under a fellowship.

Applications must be made on the blank forms which will be furnished by the Secretary or any member of the Board of Directors.

General

Food and Drugs Act Amendment.—The Governor-General in Council, August 30, 1940.

WHEREAS under the provisions of Paragraph (b) of Sub-section I of Section 3, Food and Drugs Act, as amended by Chapter 3 of the Statutes of 1939, the Governor in Council may make regulations—

> "respecting the packaging and labelling of any article of food or drug and the design of any such package or label with a view to preventing the public or the purchaser being deceived or misled as to the character, strength, quality or quantity of the article;"

AND WHEREAS under Paragraph (m) of Subsection I of Section 3 of the Food and Drugs Act, as amended by Chapter 3 of the Statutes of 1939, the Governor in Council may make regulations—

> "respecting false, exaggerated or misleading claims for any article of food or drug."

NOW, THEREFORE, the Deputy of His Excellency the Governor-General in Council, on the recommendation of the Minister of Pensions and National Health and under the above cited authority, is pleased to amend the regulations under the Food and Drugs Act made by Order in Council of the 16th of August, 1934, (P.C. 123/1852), as

amended, and they are hereby further amended as follows:

The present caption under Division I, namely, "I. Section 3(b).—Labelling", is deleted and the following substituted therefor:

"I. Section 3, Subsection I, paragraphs (b) and (m).—Labelling and Advertising".

Division I. I is amended by the addition thereto of the following section numbered 14.

14. (a) Except as provided in Paragraph (g), claims based upon the vitamin content of foods or drugs advertised for sale or sold to the general public shall be made only as hereinafter specified. The vitamins for which claims may be made include only the following which shall be designated as such: Vitamin A; Vitamin B_1 or Thiamin; Riboflavin; Nicotinic Acid; Vitamin C or Ascorbic Acid (antiscorbutic vitamin); and Vitamin D (antirachitic vitamin). The term 'Vitamin A' as used in these regulations includes Vitamin A and its precursors.

(b) Except as hereinafter provided, if the label or other advertisement of any article of food or drug makes reference to vitamin content, there shall be included a statement of the vitamins present expressed in International Units per gram for Vitamins A, B_1, and D; in milligrams per gram for Vitamin C and Nicotinic Acid; and milligrams or micrograms per gram for Riboflavin. In addition to this the potency in terms of International Units or milligrams per ounce, tablet, capsule, etc., may be stated. For foods, potency may be expressed in the prescribed units per one hundred (100) grams.

(c) No claim for the vitamin content shall be made for any article of food or drug unless the amount of vitamin present in the expected daily intake of the food or drug contributes significantly to the daily requirements of that vitamin. The following amounts represent the minima considered significant as daily vitamin supplements; for Vitamin A, two thousand (2,000) International Units; for Vitamin B_1, two hundred (200) International Units; for Riboflavin, one (1) milligram; for Nicotinic Acid, ten (10) milligrams; for Vitamin C, twenty-five (25) milligrams; for Vitamin D, one hundred and sixty (160) International Units.

(d) Claims based upon the vitamin content of a food or drug shall be made only within the following limitations:

(i) For Vitamin A: that this vitamin is an essential for the maintenance of a healthy condition in the epithelial tissue; that it is specific in the prevention and treatment of nutritional night blindness or nyctalopia of dietary origin; that it prevents, or relieves, if not too far advanced, xerophthalmia when due to Vitamin A deficiency; that its insufficiency in the diet may lessen the resistance of the body to infection.

(ii) For Vitamin B_1: that this vitamin prevents or alleviates beriberi; that it contributes to the maintenance of normal appetite; that it protects against and aids in the treatment of neuritis due to Vitamin B_1 deficiency; that the need of the organism for Vitamin B_1 is increased when metabolism is greatly augmented, as it may be in pregnancy, fever, hyperthyroidism and infectious diseases.

(iii) For Riboflavin: that this vitamin is an essential for the normal functioning of the body.

(iv) For Nicotinic Acid: that it is a specific in the treatment of pellagra.

(v) For Vitamin C: that this vitamin is specific in the prevention and treatment of scurvy; that it is a factor in the normal development and maintenance of the bones and cartilages, the teeth and gums; that the need of the organism is increased in fever.

(vi) For Vitamin D: that it is an essential in the prevention of rickets and in the normal development of bones and teeth; that the requirement is greatest in infancy and childhood, and during pregnancy and lactation.

(e) Testimonials regarding the action of vitamins or vitamin products in specific cases shall not be referred to, reproduced or quoted.

(f) No assurances shall be made regarding results to be obtained from treatment by vitamin medication or from the addition of vitamins to the diet.

(g) The above requirements shall not apply to advertisements not distributed to the general public, provided that if therein mention is made of clinical or experimental evidence naming vitamins or functions of vitamins, the source of such information is plainly stated, and provided also that such advertisement is not accompanied by any sample of the product so advertised.

(h) The above requirements shall not apply to food and drug products sold prior to January 1, 1941.

(Sgd.) H. W. LOTHROP,
Asst. Clerk of the Privy Council.

Book Reviews

Tuberculosis of Bone and Joint. G. R. Girdlestone. 265 pp., illust. $9.00. McAinsh, Toronto, 1940.

This monograph contains the extensive experience of Mr. Girdlestone at the Wingfield-Morris Orthopædic Hospital near Oxford. The first part of the work deals with general considerations of tuberculosis as a systemic disease, with its diagnosis and the principles underlying the treatment of the patient as an individual. The treatment is divided into sections: (*a*) general; (*b*) local; (*c*) operative treatment. The importance of the avoidance of sinus formation and secondary infection, with consequent rise in mortality rates is clearly stated.

The greater part of the book is divided into chapters dealing specifically with particular joints or affected regions. Each chapter treats with the pathology, diagnosis, and treatment, with valuable statistics where available. The importance of biopsy of the regional lymph glands in early diagnosis as observed by Seddon is discussed.

Two chapters, one on Pott's paraplegia bringing out views of Girdlestone, Seddon and Butler, the second on apparatus and statistics from the Shropshire Orthopædic are most valuable. Occupational therapy and rehabilitation are also included.

This monograph may be regarded as the modern attitude to bone and joint tuberculosis in the British Isles.

Diagnosis and Treatment of Head Injuries. S. W. Gross and W. Ehrlich. 275 pp., illust. $5.00. P. B. Hoeber, New York, 1940.

Each year in America the automobile takes an appalling toll in human lives, which is comparable only to the loss of life in modern warfare. It has been estimated that almost half of those who die from automobile accidents die because of head injuries. It is therefore of great importance that the general practitioner and the general surgeon, who handle most of these cases, at least in the early stages following injury, should have a clear knowledge of up-to-date methods of diagnosis and treatment of head injuries, as developed by the neurosurgical specialist.

This handbook summarizes in a clear and concise manner what might be called the modern viewpoint in the treatment of head injuries. This viewpoint stresses, above all, the importance of brain injury, and the relative unimportance of the skull injury—except in the case of compound depressed fractures. It stresses the complications of head injury which threaten life, such as hæmorrhage and meningitis and their prevention and early recognition. The importance of subdural hæmatoma,

early or late, as a cause of post-traumatic symptoms is now widely accepted.

In treatment, the modern tendency is to treat with respect every head injury sufficiently severe to cause any impairment of consciousness, and to treat with meticulous care even trivial scalp lacerations, and so eliminate all possibility of infection. A longer, rather than a shorter, period of recumbency, is advised following head injury. High intracranial pressure is controlled more by lumbar punctures and hypertonic solutions, and less by decompressive operations, than in the "old days".

Newer methods of diagnosis, such as the use of air in the ventricles and, very recently, the development of electroencephalography, have increased the accuracy of diagnosis. As a result, fewer operations are performed than used to be the case.

This book is written in a clear and simple style, and reading it is a pleasure. Basic anatomical and physiological principles are stressed; there are brief but adequate pathological descriptions. The recent literature on head injuries has been well covered. Yet, altogether it has a very practical outlook.

It can be recommended for the reading of everyone in civil or military practice and particularly for the man who has been out of touch with recent developments in this field. It can also be highly recommended to the undergraduate student who finds this subject inadequately treated in his surgical textbooks.

Chemotherapy and Serum Therapy of Pneumonia. F. T. Lord, E. S. Robinson and R. Heffron. 174 pp. $1.00. Commonwealth Fund, New York, 1940.

This book deals with the diagnosis and treatment of the various forms of pneumonia, and covers both chemotherapy and serum therapy. The indications and contraindications for these forms of treatment, their relative merits, precautions to be observed, and results are discussed in detail. In addition the authors have included in abstract much of the data concerning the biology and pathogenicity of the pneumococcus, the epidemiology of the disease, and factors concerned in immunity which were discussed in detail in previous books on this subject. The reviewer found it complete but concise, unburdened by a mass of statistical detail, yet with ample clinical evidence to prove the various points emphasized in the text. It can be highly recommended to any physician called upon to deal with problems which arise in the course of pneumonia therapy.

Treatment of Cancer and Allied Diseases. Edited by G. T. Pack and E. M. Livingston. 3 vols., 2598 pp., illust. $36.00. P. B. Hoeber, New York, 1940.

A work on cancer, in three volumes, which has been written by 147 authorities and contains some 2,600 pages and 1,500 illustrations, must emphasize the importance of this subject to the medical profession when the therapy of cancer occupies practically the whole of these volumes. It must be obvious that surgeons have had difficulty in finding elsewhere an adequate compilation of all the means we have at hand to help the victims of this disease. Many volumes have been written on cancer of particular organs, but up to now in America no complete work covering all organs has appeared. As surgeons do not ever confine themselves to one particular site for their surgery, and as cancer is seldom, if ever, entirely confined to one site or one organ, or even one tissue, surgeons will welcome this all-embracing work.

Every known treatment is clearly, concisely, and sometimes too briefly described by an author who is especially expert in the line of therapy described. Surgery, diathermy, radium, radon, x-ray, colloid and heat therapy are so well described and illustrated that anyone can find an answer here to any difficulty one may have. The new treatment by "freezing" or controlled cold seems not to have been included.

The illustrations are so good that descriptions of the various clinical types of cancer in visible areas, as skin, face, mouth, etc., are scarcely necessary and the authors have been able to stress minute details of treatment as for example, how best to obtain results with therapy, such as radium, in regions where damage to adjacent organs might result. The therapy for rodent ulcer of, or near, an eyelid, is well shown and how not to injure the eye is clearly illustrated.

Even the hopeless, incurable patient has to be treated, and one of the very best articles in the three volumes is devoted to this class of case. Forty pages cover this phase of the subject, all too often slurred over by the discouraged and baffled surgeon who so often refers the patient back to his physician, who, too, is at a loss what to do. In these days of pharmaceutical preparations *ad nauseam* it is a new departure to find 20 pages of prescriptions and formulæ for treating various symptoms, complications and terminal conditions of cancer. Special chapters on the nursing care of the cancer patient, proper diet, and allied subjects, make the work invaluable to the physician, the general surgeon and even to the so-called cancer expert. To a chief of a tumour clinic in a large general teaching hospital these volumes are a godsend; they will never lie on the bookshelf to collect dust, but will be consulted daily. No teaching school of medicine can afford to have a library without this work, where to students and staff it will be of constant help and stimulus.

The enormous work of the editors, Peck and Livingston, the excellent type and photography, one can only praise, wonder at, and offer thanks. This is by far the best work on the treatment of cancer we have ever read.

Pathology of Internal Diseases. W. Boyd. 3rd ed., 874 pp., illust. $10.00. Lea & Febiger, Phila., 1940.

This is now a well known textbook; its excellences need no fresh emphasis. The present edition shows the addition of much new material, *e.g.*, the geography of rheumatic heart disease; vitamin K in relation to bleeding in jaundice; the reticuloses, extrarenal uræmia, the prevention of silicosis and many other points. In addition there has been rewriting of certain sections such as arterial hypertension, Addison's disease, subdural hæmorrhage, the iron deficiency anæmias, etc.

These changes bring the book well up to date and keep it as one of the best of its kind in the language.

A Method of Anatomy. J. C. B. Grant. 2nd ed., 794 pp. $6.00. Williams & Wilkins, Baltimore, 1940.

The rapid success attained by the first edition of this work is sufficient proof of its usefulness and popularity, and the second edition should maintain or extend this success, for the special and peculiar features of the work are further developed and enhanced. It is a regional anatomy, describing the various parts of the human body in a simple, fresh and very illuminating manner. It illustrates its lessons with a host of simple but very instructive diagrams, each being designed to bring out one or two special points. In this new edition the number of these helpful diagrams has been greatly increased, and a section on the systems of the body has been added. The usefulness of the work as a laboratory manual is somewhat impaired by the lack of instructions for dissection, a deficiency that has been partly supplied by the publication of a small companion Handbook for Dissectors, by the author and H. A. Gates. Moreover, the regional method of approach which the book uses makes it unsuitable as a standard book of reference, and in this, as in the former edition, there is unfortunately no description of the macroscopic anatomy of the brain and central nervous system. But its method is so refreshing, simple and instructive, and its many diagrams so helpful and easily remembered, that it should be read by every student of anatomy or indeed anyone that is interested in the subject.